Cetaceans of the Channel Islands National Marine Sanctuary

By

Stephen Leatherwood

Brent S. Stewart Pieter A. Folkens

National Marine Sanctuary Program

Channel Islands

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and

NOAA, National Marine Fisheries Service
P.O. Box 271
La Jolla, California 92037

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ABOUT THE AUTHORS

STEPHEN LEATHERWOOD has been conducting research on marine mammals for twenty years, the last ten from a base at Sea World Research Institute/Hubbs Marine Research Center in San Diego. He has traveled widely, studying, photographing, and lecturing about these fascinating animals and participating in efforts to conserve them. Though author of over 100 scientific papers, he is best known for his field guides: *Whales, Dolphins, and Porpoises of the Eastern North Pacific and Adjacent Waters* and *Whales, Dolphins, and Porpoises of the Western North Atlantic* (both NOAA publications); and *The Sierra Club Handbook of Whales and Dolphins*, co-authored with Randall Reeves. His recent projects include books on bottlenose dolphins and killer whales and a series of science books for children.

BRENT S. STEWART is a staff biologist at Sea World Research Institute/Hubbs Marine Research Center, a position he has held for ten years. Brent spends much of his time in the Southern California Bight studying pinnipeds in the Channel Islands. His research on marine mammals has also taken him to the Arctic, Antarctic, North Atlantic, and the Soviet Union.

PIETER FOLKENS is a highly accomplished natural sciences illustrator, naturalist, and author with work published in seven countries and five languages during the past twelve years. Recent works include *Marine Mammals of the Gulf of the Farallones* for NOAA, a poster for the National Geographic Society, and sculpting the humpback whale miniatures seen in *Star Trek IV*. Pieter is also a lecturer at the University of California, Santa Cruz in the Division of Natural Sciences.

The authors may be contacted through:
Sea World Research Institute, Hubbs Marine Research Center
1700 South Shores Road, San Diego, California 92109

PUBLICATION NOTES

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Upon delivery of the report the Sanctuary managers judged the final product of sufficient value to justify larger production and wider distribution and the effort to facilitate general distribution began. The section *Recommendations for Further Research* was omitted in this edition because of its narrow time reference. Readers interested in the recommendations may write for a copy to the Channel Islands National Marine Sanctuary, c/o The Sea Center, 211 Stearns Wharf, Santa Barbara, California 93101.

COVER PHOTOGRAPH: Common dolphin, *Delphinus delphis*, by Sue Kruse. These dolphins may be the most common cetacean in the Southern California Bight.

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INTRODUCTION

The Channel Islands National Marine Sanctuary (CINMS) was established in 1980 to protect areas off the Southern California coast which contain significant marine resources. In the Designation Document establishing the CINMS, the caretakers were directed to develop and implement a comprehensive plan for management of the CINMS's resources, to encourage wise and compatible uses of the area, and to improve public awareness as an aid to appreciation and protection. Towards that end, the newly established management included among its first official actions the issuance of contracts to assess the current state of knowledge. This report is the result of such an assessment. Its purpose is to summarize information available on the status of cetaceans (whales, dolphins and porpoises) in and near the CINMS. This information is required so that responsible managers and staff can correctly inform the public about use of CINMS waters by cetaceans, intelligently predict and assess affects on these animals of current and planned activities (industrial, recreational and research activities, fishing and water pollution) within and near the CINMS, and plan to mitigate unwanted effects where possible. The status of cetaceans is best reviewed in the context of the basic environmental conditions which affect their presence, abundance and seasonality in the area(s) of interest.

The CINMS includes all waters within 6 nm of the four northern California Channel Islands (Anacapa, Santa Cruz, Santa Rosa and San Miguel and its adjacent islet) and Santa Barbara Island, some 25 nm to their southeast. Overall, the area set aside includes about 1250 nm of sea surface.

The islands and the CINMS are located in the Southern California Bight (SCB). The SCB is on a broad expanse of well developed continental shelf lands (also referred to as "continental borderlands") extending from about Point Conception (ca. 34°30′N) on the north to about Cabo Colnette, Baja California (ca. 31°00′N) on the south and bordered on the west by the Patton Escarpment, a steep slope south and west of the islands with contours bearing in the northwesterly direction. Defined in this manner the SCB contains nominally 25,000 square nautical miles of ocean surface. Though varied in physiognomy the region is dominated by the eight California Channel Islands – hereafter often called simply the Channel Islands – the five in the CINMS plus San Nicolas, Santa Catalina and San Clemente. (Some researchers include in the listing the three Islas Coronados, located just southwest of San Diego in Mexican territory.)

The sea bottom in the SCB is buckled by the Cortez-Santa Rosa Ridge, three deep shelf basins (Catalina, Santa Cruz and Santa Monica), two important "channels" (San Pedro and Santa Barbara) and a series of minor escarpments, canyons, banks and sea mounts (e.g. Cortez, Tanner, 60-mile and Farnsworth banks and Lausen Sea Mount). The CINMS itself is well over the continental shelf, containing waters largely less than about 60fms deep. Santa Barbara Island sits atop a rather broad mesa surrounded by relatively shallow shelf basins. On their north side, the four northern islands front a broad shallow basin, the dominant submarine feature of the Santa Barbara Channel. Greatest depths in the CINMS are those near the southern and western boundaries of the northern islands.

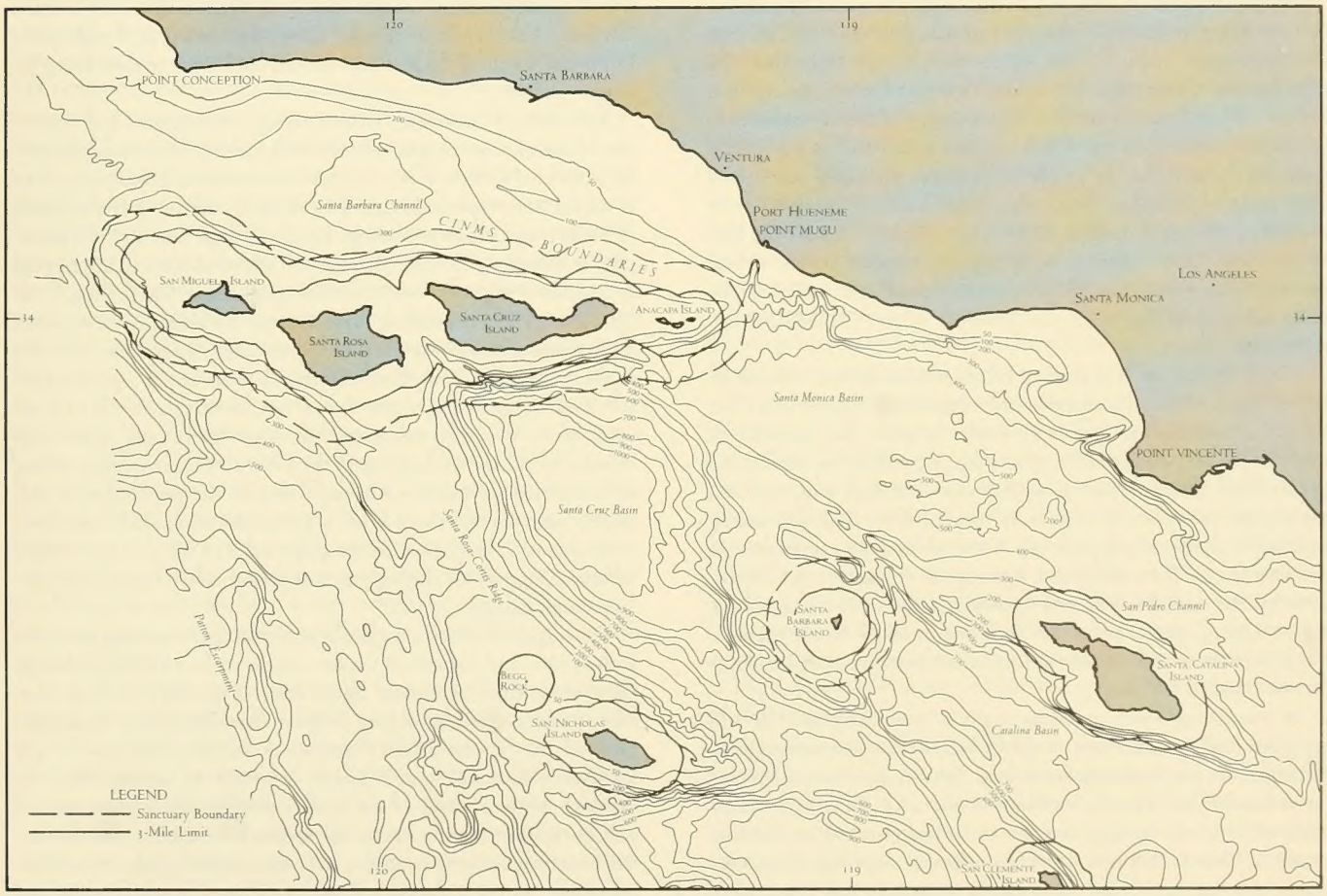


FIGURE 1. The northern portions of the Southern California Bight showing the limits of the Channel Islands National Marine Sanctuary, major components of bottom topography, and major place names referred to in the text. (Courtesy Carol Pillsbury CINMS and Charlotte Carlisle)

The islands themselves are located in a transition zone between two biogeographic provinces, Oregonian and Californian; therefore, their terrestrial biota contains features of both provinces. Similarly, the marine environment represents a transition zone between cold temperate and warm temperate/subtropical regions and, therefore, contains representatives of both regions.

The most important oceanographic features of the SCB are its surface currents and related upwellings. The dominant water flow, called the California Current, is southward, bringing in cold waters from the northeastern North Pacific. When that current reaches Point Conception the direction of flow carries it away from the shore (which below Point Conception tends east to southeast), creating a large gyre or eddy in the SCB. The return flow of that gyre, called the California Countercurrent, transports water from southeast to northwest. These two current systems, as simplistically described here, are affected seasonally by flow northeastward from the warmer Davidson Current. Such interactions of warm and cold currents produce seasonal changes in dominant marine organisms in the SCB. Further, changes in the relative strengths of these currents from year to year produce long-term shifts in dominant forms. In general, however, the cold water currents link marine communities in the SCB to more northerly communities, while the warmer northbound currents link them to more southerly communities. The gyres link conditions in the CINMS with those in the broader area of the SCB and nearby waters farther south. While the dynamics of the above described water movement assure an active flow of nutrients from both directions they also mean a like flow of pollutants, posing a threat to the future stability of the region from pollution in California and nearby Baja California.

Mixing from interaction of currents is supplemented by nutrient rich upwelling. In the SCB most such upwelling occurs from February through August when surface waters, driven away from shore by offshore winds, are replaced by colder, richer waters overturning from beneath. These frequent and thorough mixings of the water masses in the SCB create conditions which support a rich and varied marine fauna year-round. But the perids of maximum upwelling correspond with periods of longest days, when high levels of sunlight create maximum growing conditions for the phytoplankton that are the base of the food chain, ensuring that spring and summer are the richest periods. Though cetaceans are present year-round, components of the cetacean fauna in the SCB, and therefore in the CINMS, change seasonally.

There are at least 30 species of cetaceans known from the eastern North Pacific. With the exception of a handful of species which are strictly arctic/subarctic (bowhead whale, belukha and narwhal) or tropical (Fraser's, spotted and spinner dolphins, and melon-headed and pygmy killer whales) all are known from lower latitude temperate and subtropical waters of the kind characteristic of the SCB and nearby continental shelf and pelagic areas. A few of those are represented in and near the SCB by infrequent sightings or strandings and cannot, therefore, be considered normal members of the area's marine fauna. But at least 14 species either can be found in the SCB year-round in most years or annually appear in substantial numbers as they migrate into or through the area.

In considering which cetaceans might be seen within the CINMS at a given time and place one would do well to remember several facts. Cetaceans are not randomly distributed. Species do show preferences for various habitat types for feeding and migration. In fact, in discussions of cetacean ecology, species are often grouped as riverine/estuarine, coastal, continental shelf, continental slope/transition zone and oceanic forms, in reference to depth, water type and proximity to shore of the habitat(s) in which they are most often seen. Cetacean distribution is clearly tied to the distribution and movements of their principal prey species. Except for periods of voluntary and protracted fasts, such as during long-distance migrations, cetaceans expend the bulk of their energy searching for or maintaining contact with an acceptable food supply.

Table 1. Some common prey items for cetaceans occurring in the SCB. ★ = Important; ☆ = Also taken; ○ = Not usually taken; ◊ = Do not ordinarily occur, at least in important concentrations in the SCB or CINMS.

Species \ Major Prey Items	anchovies and/or sardines	squid	hake	◊ herring	◊ sauries	◊ salmon	euphausiids and copepods
Small Delphinids	★	★	★	☆	○	○	○
Med-sized delphinids	○	★	★	○	○	★	○
Beaked whales	○	★	☆	○	○	○	○
Larger baleen whales	☆	○	○	○	☆	○	★

Secondarily, cetacean distribution is related to undersea topography, major current patterns and water temperatures as they affect productivity. At present, little is understood about the complex dynamics which drive a species in its choice of habitat. For most species one is best advised to acknowledge the limits of understanding but continue provisionally to refer to them in groups by habitat types.

The CINMS and the SCB contain at least segments of all the above listed habitats except riverine/estuarine. The deep water zones in the CINMS are mostly intrusions of submarine canyons connecting to abyssal depths. However, the proximity of some other parts of the CINMS's boundaries to water of oceanic depths, particularly near the western and southwestern limits, makes probable the appearance of some pelagic species, at least as occasional vagrants, in or very near the CINMS. A variety of continental slope, continental shelf and coastal forms find waters of the SCB and the CINMS much to their liking for longer periods.

The task of accurately characterizing composition and relative abundance of cetacean species in the SCB and CINMS is compounded by additional factors. First, it must be remembered that many large cetaceans were exploited in the North Pacific during several episodes of yankee and modern whaling. Levels of depletion and, therefore, rates of recovery differ among species. Right whales, for example, exist as a pitiful vestige of a once abundant population. Overkilling in the 19th century and continuing harvests from the beleaguered stocks in the first half of this century left the population(s) at such low levels that recovery is not apparent. Even if formerly abundant in a given area, a species so devastated may now appear rare there. Gray whales, on the other hand, have been twice reduced to low levels, once in the 19th century by yankee whaling, again the first half of this century during several periods of modern whaling. Even so, the population of gray whales has recovered to, or near, its pre-exploitation stock size, some 17,000 animals; so, present use by gray whales of the area may well be comparable to its use during previous periods when it was at or near "carrying capacity".

Other species, which were also heavily affected by whaling activities, such as blue and humpback whales, appear to be recovering, though there is far from agreement about rates of recovery or long term consequences of recent whaling on those rates of recovery. As populations of the various depleted species do recover, their use of the CINMS and nearby waters can be expected to increase. For the moment, in the absence of any studies prior to exploitation, we can only guess at the levels at which each species will stabilize, how balance will be achieved among sympatric and even competing species, and how increasing human pollution and use of the marine environment and resources throughout each species' range may affect that recovery and balance.

Finally, species composition may change significantly over the years in response to long-term shifts in ocean conditions. Therefore, the characterization of composition and abundance is only good as long as the conditions in effect when it was made continue to exist. The clearest example from the northeastern Pacific is that involving Risso's dolphins. These large dolphins, apparently abundant at least as far north as Monterey during a warm water decade overlapping the turn of the twentieth century, were unreported north of Southern California and were rare in or near the SCB for the first seven decades of this century. During the early 1970's, however, sightings began to increase, apparently in response to a long term warming trend in ocean waters. That warming trend has continued. By the early 1980's, especially when "El Niño" effects increased water temperature in the northeast Pacific, this ordinarily oceanic species was again being seen with regularity north of Point Conception and became a common sight in the SCB, in general, and in and near the CINMS, in particular. Comparable increases in the SCB in abundance of otherwise northerly species might well be expected during exceptionally cold periods. No doubt there are other more subtle responses which cetaceans exhibit to changes in other environmental variables. Such changes may have pronounced effects on which cetaceans use the SCB and in what relative numbers. Despite significant increases in recent decades in the amount of cetacean research we are far from understanding those effects.

Acknowledging all the above factors, we undertook to inventory cetaceans which at present occur or probably occur within the CINMS and attempted to characterize, at least subjectively, their relative abundance, seasonality and habitat use. The SCB straddles major migratory pathways and the coast and shelf edge apparently are important reference features to some migrating cetaceans. Therefore, this inventory includes species which are migratory as well as those which are resident, those which are present seasonally in predictable numbers, and those which have been reported but are not to be expected at present.

METHODS

This report was prepared from a variety of information sources. We examined all publications we could locate which contained original data on cetaceans of the region, concentrating on more recent studies and reviews. A partial list, containing the most important sources consulted, is presented in the selected bibliography. Although we also consulted "gray" literature (government reports, mimeographed reports, etc., not subjected to peer review) and used original data from such publications, where appropriate, we were cautious about accepting and reporting on analyses presented in some of them. Conclusions in such reports often change under the hard scrutiny of peer review which precedes publication in refereed journals. For most species the most important sources were unpublished: files of various colleagues who have worked off Southern California in recent years, the Scripps Institution of Oceanography (principally the files of the late Carl L. Hubbs), the San Diego Museum of Natural History (principally the files of the late Raymond M. Gilmore), the Naval Ocean Systems Center (NOSC), Hubbs Marine Research Center (HMRC), the National Parks Service, and the Island Packers Company. The National Marine Fisheries Service (NMFS) provided recent data as follows: stranding records and miscellaneous sightings and photographs (Long Beach), stranding records, miscellaneous photographs and numerous sightings from recent surveys by aircraft (1980-1985) and ship (1979-1985) designed specifically to search for marine mammals (La Jolla).

Data from all the above sources and from miscellaneous sightings prior to 1979 in files of NMFS, SWFC and NMML, formed the basis of some previous species reviews: northern right whale dolphin, *Lissodelphis borealis* (Leatherwood and Walker, 1979), Risso's dolphin, *Grampus griseus* (Leatherwood et. al, 1980), Pacific white-sided dolphin, *Lagenorhynchus obliquidens* (Leatherwood et. al, 1984) and killer whale, *Orcinus orca* (Dahlheim et. al, 1982). Surveys by the University of California, Santa Cruz, off Southern California, 1975-1977 (Dohl et. al, 1978) and Central and Northern California 1980-1983 (Dohl et. al, 1983) were important additional sources.

Sightings from all sources were plotted (a lengthy and tedious process) and examined along with anecdotal data for evidence of patterns of occurence in and near the CINMS. No attempt was made to treat data quantitatively. Most records were incidental sightings without associated information on levels of effort. Even those data from more systematic programs (i.e. NOSC aerial and ship surveys 1968-1977, Bureau of Land Management (BLM) aerial and ship surveys 1975-1977 and 1980-1983 and NMFS aerial and ship surveys) were generally incomplete in seasons or areas covered. Therefore, plots are cautiously interpreted as they are at best incomplete and at worst uninformative or even misleading. Further, for most species it was necessary to examine data from over 15 years together as sample sizes for any given year or for small blocks of years were usually inadequate. Therefore, trends occuring in that period were likely masked.

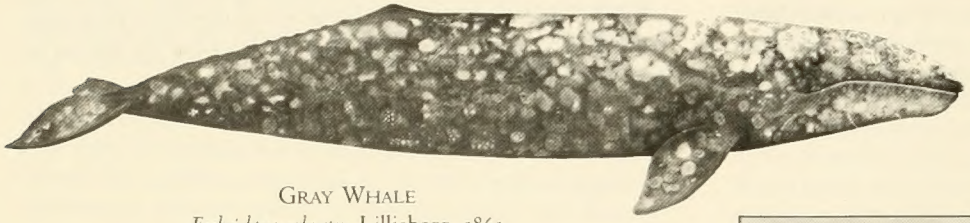
Overall the review and evaluation confirmed two basic expectations. First, there is little direct information on cetaceans within the boundaries of the CINMS itself. Therefore, one must rely on all available pertinent data from the cool temperate eastern North Pacific, with special emphasis on that from the SCB and adjacent pelagic zones. Second, there are recent trends apparent in use of the SCB and CINMS by species formerly not found there in any significant numbers – because of changing environmental conditions or recovery from previously depleted levels, or both. This second factor strongly supports our recommendation that a coordinated program of research be implemented within the CINMS to continue to monitor status of its cetacean inhabitants.

Towards that end the following report includes four sections: systematic accounts, treating each resident, migratory, or reported species from the SCB; recommendations for further research [not included in this version, see publication notes]; aids for implementing a proposed sightings network, including a miniguide to identification of the common cetaceans in and near the CINMS (appendix I); and aids for implementing a proposed strandings network, including a dichotomized key to the identification of cetaceans (Appendix II).

LARGE CETACEANS (12-26 meters maximum length)

This section includes seven of the nine baleen whales which occur in the eastern North Pacific and adjacent Arctic waters (the eighth, the minke whale, *Balaenoptera acutorostrata*, which reaches only about 10 m maximum length, is listed with the medium-sized whales; the ninth, the bowhead whale, *Balaena mysticetus*, is restricted to the Bering, Chukchi, and Beaufort Seas). Four of those occur regularly, three rarely if at all in the SCB. The group also includes the two largest toothed whales, the sperm whale, *Physeter macrocephalus*, and Baird's beaked whale, *Berardius bairdii*, both of which are found commonly in pelagic waters along and west of the Patton Escarpment and also enter the SCB.

Residents and Common Migrants



Gray Whale
Eschrichtus robustus Lilljeborg, 1861

The gray whale is probably the best known of the great whales of the northeastern Pacific and the species most frequently encountered in and near the CINMS, albeit seasonally. The vast majority of the population spends the winter in subtropical calving/breeding lagoons of mainland Mexico and the west coast of Baja California and summer in arctic and subarctic waters above Unimak Pass, principally the northern Bering and southern Chukchi seas. Migrations betweeen these widely separated "grounds" occur, for the most part, at predictable times and along well defined routes.

Although there are a few early migrants and stragglers, the vast majority of southbound migrating gray whales leave the Bering Sea between mid-November and mid-December in components somewhat segregated by age-sex class. The southbound movement along the Pacific coast of North America spans the months November through January or early February. Some whales do not complete the southbound migrations to southern lagoons, electing instead to remain off British Columbia, Washington, Oregon, or California.

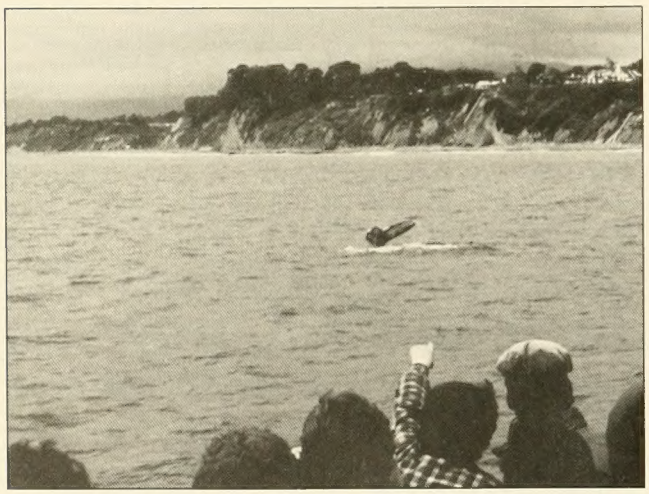


FIGURE 2. Nowhere are whales more singleminded-of-purpose than southward migrating gray whales. In December through February, as singles and in groups of up to 18 individuals, they annually parade through the SCB en route to the lagoons of Baja California and mainland Mexico. A major whale watching industry capitalizes on this highly predictable behavior. (Photo of Santa Barbara by P. C. Howorth.)

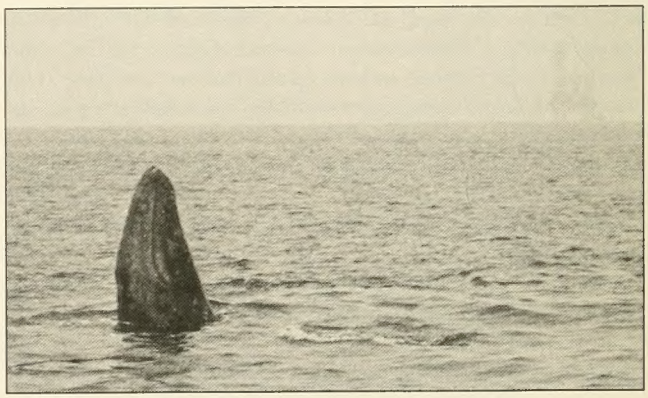


FIGURE 3. Migrating gray whales pass through areas of natural oil seeps (top) as well as near oil rigs and other related facilities (bottom). Recent studies indicate that oil on the sea surface and industrial noise from oil exploration and development have significant though shortlived effects on gray whale behavior. (Photos off Anacapa Island, 20 January 1985, by S. Leatherwood, (bottom); and off Coal Oil Point, January 1981, by B. S. Stewart; (top).)

Most southbound migrants remain close to the coast, in water less than 100 fathoms deep, until they reach Point Conception, which they do between early December and late January, with a peak around Christmas. (Whales do strike across open water at such places as the entrances to Icy Strait and other passes into southeast Alaska and British Columbia, the Strait of Juan de Fuca, San Francisco Bay and Monterey Bay, briefly passing through deep waters as they do so.) At Point Conception, where the mainland coast makes a radical turn eastward, no more than about 35% of the animals turn to follow the mainland coast. At least 65% of the animals, perhaps even 75% or more, continue directly southward, swimming across open water towards the northern Channel Islands. Then, they disperse through the SCB, taking any one of a series of interisland routes. The proportion of the population using each of those interisland routes is unknown. However, the following summary, from the best available data, describes our current understanding:

An apparently small number of whales travel well outside the islands along the edge of the Patton Escarpment.

Most whales pass west of San Miguel Island or through the passes between San Miguel and Santa Rosa islands, Santa Rosa and Santa Cruz islands and Santa Cruz and Anacapa islands. Far more whales pass along the western and southern than along the northern sides of these four northern islands.

Some whales from this northern island flow return to the mainland between Ventura and Los Angeles; others continue southward on interisland routes.

Whales arrive at San Nicolas and San Clemente islands mostly from the north/northeast and pass largely along the seaward coasts (It is apparently more common for whales to use the east coast of San Nicolas Island than it is for whales to use the east coast of San Clemente Island).

Whales arrive at Santa Barbara Island from a variety of northeasterly to northwesterly headings and pass along either shore. From Santa Barbara Island, however, most head directly for Santa Catalina Island, where they pass principally along the seaward shore.

Once past the southern Channel Islands (Santa Catalina and San Clemente) most whales return to the coast, reaching the mainland migrating stream between San Diego and northern Baja California.

Some whales continue on into the Sea of Cortes and there are reliable sightings from Islas de Guadalupe and los Revillagigedos. However, most of the population winters in and near lagoons on the west coast of Baja California and the mainland coast of Mexico near Yavaros.

FIGURE 4. Gray whale adult (about 40′ long) and calf (about 15′ long) off Point Conception, January 1981. Studies in Winter 1981 and 1983 in the Santa Barbara Channel have shown that a significant number of calves are born on the southbound migration rather that in the Mexican lagoons. (Photo by B. S. Stewart.)

It has long been believed that most gray whale calves are born in Mexican waters in and near these calving lagoons. But recent studies off Central and Southern California have revealed that a higher number of calves than expected actually are born on the southbound segment, some as far north as southern Oregon. Some of these mothers and calves pass throgh CINMS waters.

Gray whales begin leaving the lagoons for the northward migration as early as mid-January; so, the tails of the southbound and northbound migrations overlap briefly off Baja California and Southern California in January and February. The northward migration is more protracted than the southbound and occurs in two distinct waves or pulses. The earlier pulse includes a broad cross section of the population. The later, smaller wave consists almost exclusively of females and their calves. The two waves pass through the SCB in peak numbers in April/May and early June, respectively. Once they are north of Point Conception, females and calves tend to be closer to the coast than do other animals. But within the SCB, whales of all ages apparently disperse widely. Little is known about relative proportions of the northbound population taking coastal versus interisland routes through the SCB or about specific interisland routes used. Gray whales are seen in and near CINMS waters as well as along the mainland coast. It is likely that northward migrating gray whales are, in most of the SCB as at most other times and locations, principally coastal and that their excursions across open water are by more-or-less direct routes from one island or major land point to the next. Boat operators from Ventura and Santa Barbara indicate that in the area of the northern Channel Islands far more whales are seen outside the islands than in the Santa Barbara Channel. That more coastward portion of the population tends to flow further from shore, for example, near Platform Gina, in March/April but closer to the mainland shore in April/May.

The occasional observation of females and calves or yearlings in the same kelp areas off the mainland or California Channel Islands on successive days has lead to speculation that quiet kelp beds are of special importance to newborn and juvenile whales during spring. Given that some 60% of the kelp beds in the SCB are in the CINMS, some young whales might be expected to linger in waters of the CINMS. The fact that northbound whales move more slowly than southbound whales means that the period of exposure of any given whale to a given area is likely to be longer in early summer than in winter. Some of the malingering on the northbound migration is probably for feeding.

FIGURE 5. A juvenile gray whale "feeding" in the kelp off Santa Barbara. The kelp beds of the SCB might well be important feeding areas for northbound gray whales, especially juveniles and females with calves. Given that some 60 percent of the kelp beds in the SCB occur in the CINMS, such beds may deserve special study and protection. (Photo by S. Anderson, courtesy C. Pillsbury.)

As with the autumn/winter migration, in spring/summer some gray whales do not complete the migration to subarctic or arctic waters, electing instead to spend summer/fall in waters of California (numerous sites from Monterey Bay northward), Washington, British Columbia, or Alaska (Cape St. Elias, Kodiak Island and on the south shore of Bristol Bay). The numbers of animals in these "summering" populations appear to be increasing along with the growth of the population at large. By recent accounts there are some 17,000 gray whales in the North Pacific and the population is growing at a slight rate annually.

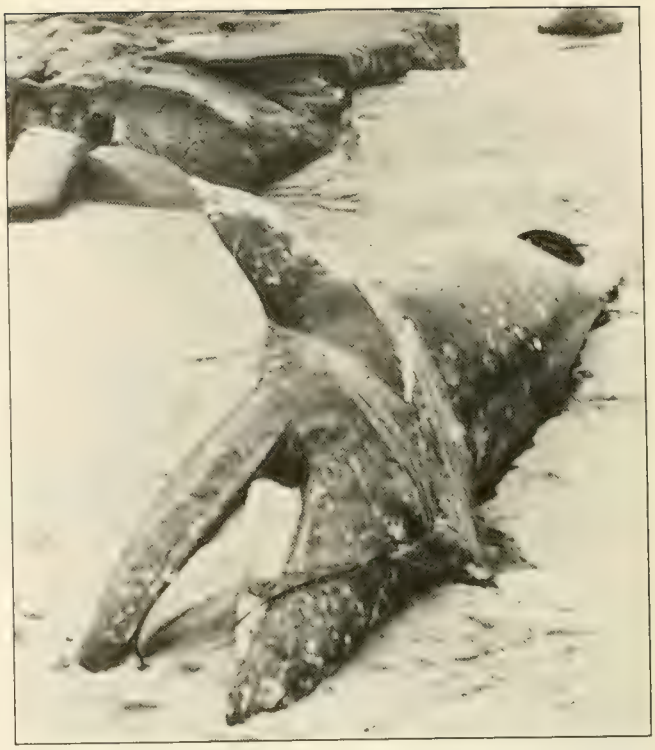


FIGURE 6. In recent years, numerous gray whales have been found entangled in gill nets set in their migratory corridors. Growing gill net fisheries could pose a significant threat, particularly to young animals. (Photos at Ocean Beach, San Diego, California, January 1985 by S. Leatherwood, above; and off Ventura, February 1985 by K. Connally, left.)

HUMPBACK WHALE
Megaptera novaeangliae (Borowski, 1781)

The humpback whale has a coastal distribution on both sides of the North Pacific and also occurs regularly and in relatively large numbers around offshore islands, such as the Revillagigedos off Mexico, the Hawaiian islands in the mid-Pacific, and the Ryukus off southern Japan. These well known whales (often featured in film and slide presentations and familiar to many because of thier complex and haunting "songs") were hunted by primitive methods off Japan and along the Pacific northwest coast of North America from very early times. Yankee pelagic whalers killed some humpbacks during the nineteenth century, but mainly when more valuable species, like the right and sperm whale, were unavailable.

It has been estimated that there were about 15,000 humpbacks present in the North Pacific around the turn of the century, divided in unknown proportions among three putative stocks: Mexican – off the mainland Mexican and Baja California coasts and around the Revillagigedos; Hawaiian; and Asian – around the Mariana, Bonin and Ryuku islands and Taiwan. It should be noted that long term studies of humpback whales in the Atlantic, using photo-documentation and individual identification to study movements and stock relationships, have forced constant revision of some rather simplistic views once widely held about "stocks" there. The result has been a more complex model of relationships between "summering" and "wintering" stocks of North Atlantic humpback whales. Comparable work underway in the Pacific may well result in such revisions here.

Modern whaling, from shore stations and pelagic fleets, took a heavy toll on all stocks of humpback whales. An estimated 23,000 plus humpback whales were killed in the North Pacific between 1905 and 1925, including at least 11,167 from the Mexican and Hawaiian stocks, taken in the following areas and approximate numbers: western Alaska 1,821; central Alaska 1,823; Southeast Alaska 329; British Columbia 2,835; Washington and Oregon 1,920; California 3,377; and Baja California 2,042. There is no reliable estimate of the size of stocks or populations at the end of the 1965 whaling season, when humpback whales received complete protection. However, it is clear that populations everywhere were severely depressed. The severity of the over-whaling in the North Pacific is best seen in the Asian stock, in which whales apparently continue to be scarce on the wintering grounds even after 20 years of protection. It is equally clear, however, that humpbacks in many areas are, at present, recovering under full protection. For example, between 1977 and 1982 over 1,000 humpbacks were individually identified on the Hawaiian wintering grounds alone and most researchers actively studying this species in the North Pacific believe that there are well over 2,500 animals in the northeastern Pacific and that the population is growing at a healthy rate.

In that broad area, humpbacks range from the Bering Sea south to Hawaii, to the tip of Baja California, into the Sea of Cortez at least as far as Espiritu Santu Island, and along the mainland coast of Mexico at least as far as Islas Tres Marias. Migration routes among these "grounds" are not yet clearly delineated, but photo-identification studies have shown that humpbacks that winter in Hawaii travel to feeding grounds off Southeast Alaska, south central Alaska and British Columbia, and that some individual whales winter in Hawaii and Mexico in different years. The northern limit of winter distribution in the eastern North Pacific is thought to be Northern California, the southern limit of summer distribution northwestern Baja California. Thus, some animals may be present year-round near the Farallon Islands, in the SCB and off northwestern Baja California. Photo-identification studies are currently underway on the Farallon Basin to determine whether the same individuals remain there throughout the year or whether different components of the population use the area at different seasons. Similar studies will be necessary in the SCB, where humpbacks can be found near the mainland coast and islands, albeit in small numbers, in any quarter of the year.

FIGURE 7. Humpback whales, severely depleted by whaling through the 1960s, are making a dramatic comeback in the eastern North Pacific. They are being seen with increasing frequency around the northern Channel Islands. (Photo by R. L. Pitman.)

Shore observers at San Miguel Island report frequent observations of groups of humpbacks, mostly northbound whales, from late June through September. These groups often include females and young of the year. At this time of year, humpbacks often approach very close to the kelp beds, as did a single animal off the south shore of San Nicolas Island in July 1984. Aerial and vessel surveys of the SCB conducted for the Naval Ocean Systems Center, (1968-1978), and for the Bureau of Land Management, (1975-1978) resulted in 33 observations of humpback whales, distributed by season as follows: qtr 1 (7); qtr 2 (7); qtr 3 (10); qtr 4 (9). Aerial and shipboard observers working in the SCB since 1978 have noted concentrations of humpbacks off the three largest of the northern islands including at least one occurrence each quarter near Adams Cove, San Miguel Island. Further, observations of feeding, often evidenced by large flocks of feeding birds, in March, May, June, July, August, September, November and December, demonstrate that not all humpbacks are simply passing through the area.

One can only speculate whether the component(s) of the population using the SCB, particularly waters of the CINMS, will increase proportionate to the growing population overall. Eastern Pacific humpbacks are known to feed on anchovies, krill, pelagic crabs, sardines, cod and even salmon in different parts of their range. In other areas where humpback whales and net fisheries overlap, humpbacks are frequently entrapped or entangled, in wiers, nets, traps and fishing rigging. During Christmas week 1984 personnel from the Santa Barbara Musuem of Natural History found two humpback whales entangled in gill nets off Santa Barbara. Such conflicts are likely to occur with increasing frequency in the SCB as gillnetting and other commercial fishing in that area increases.

FIGURE 8. Some humpbacks are present all year in the SCB, especially west of San Miguel Island. The presence of birds above an animal often indicate feeding activity. (Photo the from north shore of Santa Cruz Island by P. C. Howorth.)

Blue Whale

Balaenoptera musculus (Linnaeus, 1758)

Movement patterns of baleen whales generally consist of poleward shifts in spring/summer and shifts back towards the equator in autumn/winter. Unfortunately, however, neither the seasonal distribution nor the routes travelled by blue whales in the eastern North Pacific are well mapped. Whaling records indicate that some degree of north-south movement takes place, but in parts of the species' range blue whales are present in unexpected months. There may be geographically separate stocks whose wanderings, viewed collectively, defy recognition of neat migratory patterns for the species in the eastern North Pacific.

Blue whales are distributed from the waters off Panama north to the Aleutian Islands, venturing occassionally into the Bering Sea and rarely, perhaps, even into the southern Chukchi Sea. An apparently isolated, year-round stock exists between about 800 and 2000 nm off Central America between latitude 7°N and latitude 9°N and some of the blue whales seen in the Sea of Cortes, as far north as the northern Midriff Islands, may remain there all year. The blue whales encountered in the SCB and CINMS, however, are probably part of a more general eastern North Pacific stock best known from Mexico to the northern Gulf of Alaska and north central North Pacific.

Blue whales feed almost exclusively on krill and pelagic red crabs, so their protracted stays in a given area are related largely to availability of ample supplies of these organisms. Blue whales usually occur singly or in pairs in most of their range, but large groups (40 or more) have been seen in areas where prey are abundant, particularly off Mexico.

Blue whales can be seen off the west coast of Baja California from about February through July. Peak numbers have been reported there in April. Whales appear in the area again in October but have not been reported between November and January. The absence of sightings in autumn/winter may reflect reduced searching effort during those months, but Norwegian whalers working the Baja coast in the 1920s and 1930s killed blue whales primarily in late winter through spring between Cabo San Lucas and Cedros Island.

Blue whales are seen fairly frequently off Southern California from June through December. Encounters have been most frequent in July through October. Many animals appear to be migrating northward just outside the Channel Islands, along the edge of the Patton Escarpment, or to be lingering around Tanner or Cortes banks, along the Cortes Ridge, or north of Santa Rosa and San Miguel islands. We are aware of occasional sightings within the SCB in the last 20 years, from: the Coronodo Islands, San Diego Bay, Pacific Beach, La Jolla, San Clemente Island (east and north shores), Santa Catalina Island, Santa Barbara Island, San Nicolas Island, San Miguel Island, to within approximately 200 m of Castle Rock in October, and in the northern Santa Barbara Channel to within 5 nm of the mainland coast in September and November. Blue whales, thought to be the same individuals, have been reported around San Miguel Island for a month or more at a time during summer and autumn. This may mean that in a given year some whales do not venture north of Point Conception even as the population center shifts northward.

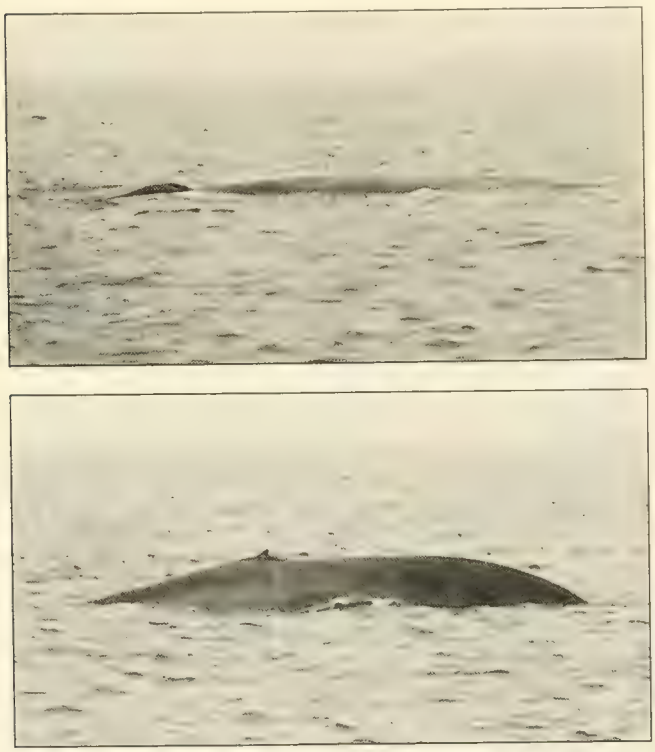


Figure 9. Sightings of blue whales are fairly regular from June through September-October along the edge of the Patton Escarpment, outside the Channel Islands. During this period some whales venture over the shelf, especially near the outermost islands. (Photos from 4 nm, top, and 7 nm, bottom, north of San Miguel Island, August 1979 by D. Seagars.)

Figure 10. A blue whale takes a breath off San Nicolas Island in 1975. Occurrence of this species near the CINMS can reasonably be expected to increase as the populations grow. (Photo by J. D. Hall.)

In recent surveys off Central and Northern California (between Point Conception and Cape Mendicino) researchers located blue whales in all months from May through November in water 45 to about 2000 fathoms ($\bar{x} = 493$ fathoms) deep, as singles and pairs and less frequently in groups of up to ten. Some blue whales have been reported far off the Northern California coast in May; so, at least some of the species' movements in the area occur along pelagic routes. Some blue whales continue northward as far as the three major summering grounds – one in the eastern Gulf of Alaska, one south of the eastern Aleutian islands and one between the western Aleutians and Kamchatka.

Catches of blue whales from British Columbia shore stations peaked in June and September, suggesting a northward movement past Vancouver Island in spring and a southward shift in autumn. Blue whales have been seen in Monterey Bay in recent years in September through December. Catches off San Francisco in the 1950s and 1960s occurred primarily in September and October and were presumed to be of whales migrating southward.

Although most whales appear to have migrated through the SCB and arrived back on the southern grounds by October, several bits of information strongly suggest that the SCB is included in the blue whale's range year-round: a single sighting off San Clemente Island in December 1977; a report that in November 1985 there were four different groups of blue whales in the Santa Barbara Channel between Ventura and Anacapa Island; and the presence of whales elsewhere off Southern and Central California in November and December. This being the case, blue whale calves, usually born in autumn or winter after the whales' departure from high latitude feeding grounds, likely pass near or through waters of the SCB, and possibly also the CINMS, when southbound. Some may linger in the area.

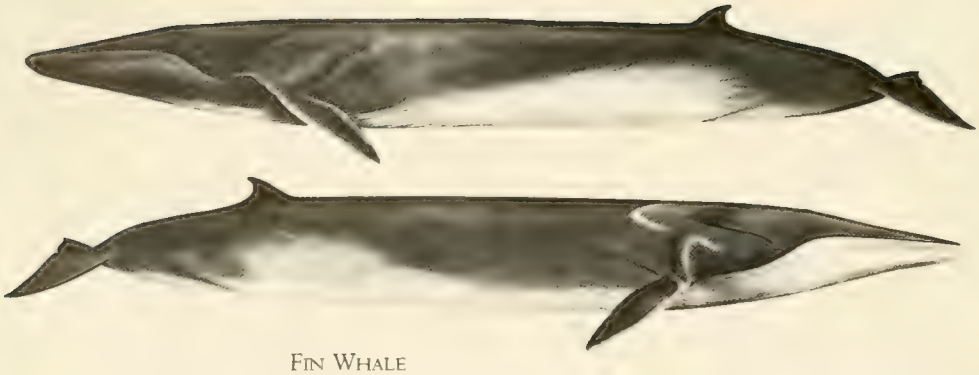
There are few reliable data on abundance of blue whales anywhere. In 1874, Charles M. Scammon reported that there were "large numbers" of blue whales off the coasts of the Californias, usually close inshore, between May and September. He and his fellow yankee whalers did little to reduce the numbers of blue and other fast swimming rorquals, preferring instead to concentrate on the slower moving and more "catchable" species (sperm, gray, bowhead and right whales). In fact, Scammon wrote, "it [the blue whale] is considered the swiftest whale afloat and for this reason is seldom pursued and still more rarely taken." He regarded as noteworthy the takes of blue whales off Baja California in the late 1850s (at Bahia San Bartolome, Ascensión and Cedros islands and Bahia San Quentín) by whaling vessels and the killing of a 92 footer in 1862 off Monterey by shore whalers.

Recently, scientists have estimated that around the turn of the century there were some 4,500 to 5,000 blue whales in the North Pacific. Because they had not been exploited prior to the beginning of this century, it is reasonable to suppose that the population(s) (or stocks) comprising that total were healthy at the turn of the century. It was not long into the twentieth century, however, that the luck of the blue whales and other large rorquals ran out. Steam and subsequently diesel powered whalers and the perfection of the explosive harpoon made all whale species vulnerable to whaling. Since these modifications made it possible to catch and kill all species it became sound economic logic to kill the largest "catchable" whales first. Therefore, as the largest animals on earth (to 30 m and 25 metric tons) the blue whale received immediate and prolonged pressure.

In the years betwen 1910 and 1973 approximately 360,000 blue whales were killed worldwide. Though the vast majority of them (some 330,000) were killed in the Antarctic, there were significant catches elsewhere, including 8,200 in the North Pacific. Most of those 8,200 were taken from grounds between Japan and Kamchatka and along the south side of the Aleutians. But there were significant removals from the northeast Pacific, as well: e.g. 835 and 215 from shore stations at Akutan (1912-1939) and Port Hobron (1926-1937), Alaska, respectively; over 250 by shore stations in Southeast Alaska, British Columbia and Washington shore stations 1908-1952; about 50 by a California shore station operating within about 125 nm of the Golden Gate from its base in San Francisco Bay, 1958-1965; and over 2,800 by catcher boats and floating factories operating off Baja California, 1913-1929. Little modern whaling was conducted in or near the SCB or in the broader area from northern Baja California to Guide and Pioneer Sea Mounts off San Francisco. Five blue whales were taken off Moss Landing in 1919-22 and an 80 footer was taken near San Clemente Island in July 1927.

By the time blue whales were extended protection in 1966, populations were significantly depressed and there was concern about the ability of most stocks to recover. In 1984 it was estimated that there were between 1,400 and 1,900 blue whales in the North Pacific, mostly on the eastern side. It was further reported that the eastern North Pacific stock, though still somewhat depressed, was growing at an unknown rate. That growth has resulted in progressively more sightings of blue whales each year off California, in general, and in the SCB, in particular.

FIGURE 11. A blue whale stranded on Jalama State Beach, San Luis Obispo County in 1976, dwarfs curious onlookers. Surprisingly, living blue whales may well be the third most common large whales in and near the CINMS, behind gray and humpback whales. (Photo by S. Leatherwood.)



FIN WHALE
Balaenoptera physalus (Linnaeus, 1758)

The widespread distribution of fin whales in the North Pacific, from the ice edge in the Arctic to lower latitudes around 20°N along Asian and North American coasts, has confused many attempts to define the species' seasonal movements. In summer, large concentrations of fin whales have frequently been seen in high latitudes feeding, primarily on dense concentrations of euphausiids. Such feeding aggregations helped support shore whaling stations at Akutan (eastern Aleutians), Kodiak Island (Gulf of Alaska) and along the coasts of Washington, Oregon and California during the early 1900 s. Whalers at these stations killed large numbers of whales (mostly fin, blue and humpback) from small catcher boats operated within an approximately 100nm radius of the whaling stations. The seasonality of observations and kills of whales at these stations (both primarily in summer) long provided our best understanding of the distribution and migration patterns of most great whales in the eastern North Pacific. From such data, fin whales were noted to appear off Vancouver Island, British Columbia, as early as March. Fin whales were killed, and were apparently most abundant, off Admiralty Island in the Gulf of Alaska in August. Nearly all fin whales killed by Akutan and Port Hobron whalers were killed from May through September with a peak in August. Collectively, these data suggest an influx of some fin whales into northern temperate waters for the summer season. The absence of whaling in winter months has left open the question of whether or not some fin whales remained in northern temperate waters year-round.

Farther south, fin whales were commonly taken off California in May, June, July, and August, indicating that not all whales migrated from subtropical to northern temperate/subarctic waters. Furthermore, miscellaneous sightings of fin whales during the past thirty years indicate that significant numbers of this species occur off Southern California in all seasons, although numbers in that area peak, mainly in waters west of the Channel Islands, in late May to early June. Mid-summer whales may be either those transiting through the the area or on their way north or south, those that reside in local waters year-round, or both. In surveys conducted by the U.S. Navy and others from 1969 through 1978 fin whales were seen in low numbers but were recorded in all months of the year. In surveys conducted in the SCB 1975-1978 by the University of California Santa Cruz for the Bureau of Land Management fin whales were documented off Baja California and in the SCB at all seasons, but the frequency of sightings in the SCB did increase from June through September.

FIGURE 12. Fin whales, the second largest of the rorquals, are present in the SCB in small numbers at all seasons but their numbers apparently peak, mainly in waters west of the Channel Islands, in early summer. (Photo by P. C. Howorth.)

Within the SCB, fin whales have been reported near the Santa Rosa-Cortez Ridge, the Tanner-Cortes Ridge and near San Nicolas and San Clemente islands. In winter they appear to reside principally offshore, as they are most often seen outside the Channel Islands. In summer we have seen them ourselves and are aware of sightings by others off Painted Caves (N.W. Santa Cruz Island), in the Santa Barbara Channel east of Yellow Bluffs, off San Nicolas Island, at four locations along the southwest side of Santa Cruz Island, and at two locations off the southwest side of Santa Rosa Island.

Females are bred in winter and give birth one year later. Calves are nursed for about seven to eleven months and are generally weaned (often before the end of the summer following birth) while on northern feeding grounds or while females are moving south in autumn towards wintering grounds. Limited tagging data indicate that some fin whales move from wintering (November - January) areas off Southern California to summering (May - July) areas off Oregon and British Columbia and in the Gulf of Alaska.

It is generally assumed that some whales from the "Asiatic" and "American" stocks move northward in summer to the Aleutian Islands and into the Bering Sea, where they may intermingle. It is not known if whales move between wintering areas as a result of such intermingling.

Although the IWC considers the North Pacific as one management unit, there is evidence supporting the idea that at least two stocks of fin whales exist in the North Pacific: a "western" or "Asiatic" stock that ranges along the coast of Japan and Siberia, and an "eastern" or "American" stock that ranges along the coasts of Washington, Oregon, California and Baja California and in the Gulf of California. Alternatively, it has been suggested that fin whales in the Gulf of California (perhaps resident), in the East China Sea, and off California (including whales occurring off British Columbia) may belong to isolated stocks.

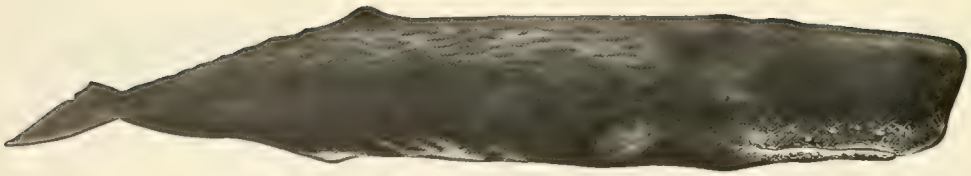
Small numbers of fin whales were killed off the coast of Japan from at least the mid-seventeenth century through the early 1900s when modern whaling techniques were introduced there. Annual catches then increased to a peak of 1040 in 1940 and continued at 300 to 400 per year until World War II. Catches in Japanese waters began to decline in the mid-1940s and continued to decline until 1975, when the IWC prohibited the taking of fin whales there.

Although California shore whaling began in 1851 at Monterey and then soon after at other stations along the upper and lower California coasts (Half Moon Bay, Pigeon Point, Carmel Bay, San Simeon, San Luis Obispo, Goleta, Portuguese Bend, San Diego, and Punta Banda), fin whales were rarely taken, as they are fast swimmers and sink when killed. They began to be hunted extensively in the North Pacific only after modern whaling techniques were introduced. Prior to 1945, whaling in the North Pacific was conducted primarily by catcher boats operating out of land stations in Canada, the United States, Japan and the Soviet Union. Catches of fin whales off the west coast of North America occurred mostly off California, British Columbia, and Alaska. Large numbers of fin whales were killed by Alaskan shore whalers operating from Akutan from 1912 through 1939 (more than 3000 killed) and out of Port Hobron from 1926 through 1937 (more than 300 killed).

When the modern era of pelagic whaling began in the North Pacific in 1952, a single factory ship began operating off the Asian coast. From 1954 through 1961 only three factory ships were operating, but they had expanded operations eastward to the American side of the North Pacific. During this time, Japanese whalers killed more than 3,000 fin whales near Akutan Island and in the Bering Sea while Soviet whalers took apparently large (but undocumented) numbers of fin whales in the Bering Sea. Along the United States coast, six vessels operated from three shore stations from 1956 through 1972, when commercial whaling was prohibited by U.S. law. During this time fin whales were taken along with sei, humpback, blue and sperm whales, although fin whales became the major species pursued in the mid-1960s because of declines in catches of humpback and blue whales. Annual catches of fin whales in the North Pacific and Bering Sea ranged from 1,000 to 1,500 in the mid-1950s through the mid-1960s, after which they declined sharply. Whaling for fin whales in the North Pacific ended in 1976 when the IWC judged the North Pacific fin whales as deserving of protection and prohibited further harvesting.

The pre-exploitation populations of fin whales in the North Pacific have been estimated at 42,000 to 45,000 with 25,000 to 27,000 in the "American" region and 17,000 to 18,00 in the "Asian" region. Recent data on the abundance of fin whales in various areas comes mainly from opportunistic sightings or from geographically localized surveys of marine mammals. Observations by Japanese scouting boats indicate that fin whales are abundant in some former northern whaling grounds. Recent aerial surveys in the Bering Sea and the North Pacific have documented the presence of fin whales there, primarily in summer, although they did not appear to be extremely abundant. Aerial surveys of Southern, Central, and Northern California waters have also documented that fin whales are present but apparently not abundant, in these areas. Recent estimates of current population sizes were 8,520 to 10,970 for the "American" region and 5,100 to 7,710 in the "Asian" region. Continued sightings, perhaps increasing in frequency, should be expected in and near the CINMS especially near San Miguel, Santa Rosa and Santa Cruz islands in summer, as population(s) continue to recover.

FIGURE 13. Two of a group of five fin whales sighted at 31°21′N, 116°41′W in the southern SCB. Fin whales may be present in the SCB year-round. Note the sloping dorsal fin (left) and the white right-lower lip (right). (Photos by P. Folkens.



Sperm Whale

Physeter macrocephalus (Linnaeus, 1758)

Sperm whales are found world wide in pelagic waters. Only adult males routinely venture above latitude 40° in either hemisphere; all other animals remain year-round, and most adult males remain during breeding seasons, in waters between latitudes 40°N and 40°S. One often quoted recent paper estimated that there were some 800,000 adult sperm whales or 1.5 million total sperm whales, including calves and juveniles, world wide. Nearly half of those are believed to be in the North Pacific.

There is still debate about the identity of sperm whale stocks in the North Pacific, debate fueled by the fact that the last area of major exploitation of sperm whales in the world has been the waters off Japan. Some workers postulate that there are three stocks – Asian, central, and American – while others argue that there are only two – western (Asian) and eastern (American). Whatever the correct definition of relationships among north Pacific sperm whale groups, however, any animals occurring in the SCB and CINMS belong to the easternmost stock.

Large numbers of sperm whales were killed in the North Pacific by nineteenth century yankee whalers, mostly in waters south of latitude 40°N. Modern shore-whalers killed just over 7,000 between 1905 and 1971, including over 1,000 off California. But the most significant impact on the populations has been that from takes by Japanese and Soviet whalers, operating from land stations and pelagic fleets. Such operations killed nearly 269,000 sperm whales between 1910 and 1976. Effort and catches in those fisheries increased after World War II, resulting in a peak kill of over 16,000 sperm whales in 1968. Pelagic whaling for sperm whales has stopped. The fate of Japanese shore stations remains a disputed matter as nations argue and posture, anticipating the start of the IWC's ban on whaling, effective in the 1986 season. Political settlements between the US and Japan may prolong the life of Japanese shore fisheries through 1989, but the matter is, at present, in US Federal Court. Failing a major rebirth of the whaling industry, however, North Pacific sperm whales should flourish under impending protection and reinvade numerous areas in which their numbers have been reduced by whaling.

Sperm whales show a clear preference for deep waters at the continental shelf edge, on the continental slope, or over deep offshore canyons. However, in areas where such deep water canyons intrude into the continental shelf, they occassionally stray over shallower shelf waters. Sperm whales are known to be fairly common off Central California from at least November to April and were taken by yankee whalers operating off central and southern Baja California at those times of year. Movements of sperm whales past the latitudes of the SCB appear, from the few offshore surveys at those latitudes, to occur primarily seaward of the shelf edge. Nevertheless, we have learned of 11 verified records of sperm whales over continental shelf waters of the northern SCB since about 1965. These include seven from waters immediately adjacent to the CINMS, the most recent just inshore of east Anacapa Island in October 1985. At the latitudes covered by the CINMS one might meet with any age/sex of sperm whale, especially in warm water years when pelagic squid invade in greater than usual numbers. To date, however, reported sightings have involved large solitary animals, presumably adult males.

Figure 14. Sperm whales, ordinarily creatures of the deep ocean, do occassionally wander over the SCB, as did this large male off San Nicolas Island in April 1974. We are aware of only eleven verified records of sperm whales over continental shelf waters in the northern SCB since 1965. (Photo by S. Leatherwood.

Baird's Beaked Whale
Berardius bairdii Stejneger, 1883

Baird's beaked whales are endemic to the North Pacific, where they inhabit higher latitude temperate to lower latitude polar waters. There are records of their occurrence from as far south as latitudes 28°N off Baja California, 25°N off Japan and 30°N across the central Pacific. Although these may represent the usual wintering limits for most of the population(s), some Baird's beaked whales appear to be present off Baja California and Southern California, at least, year-round. North and west of these areas, Baird's beaked whales are widely distributed in waters of the North Pacific, Gulf of Alaska, and Sea of Okhotsk. Some animals migrate into the Bering Sea in spring and remain there until about September, ranging at least as far north as St. Matthew Island and Olyukorskiy Bay.

Some 30 years ago it was hypothesized, based on sightings and whaling records, that in the western North Pacific Baird's beaked whales undertook migrations that were atypical of whales, spending winter and spring in northern and summer and autumn in southern waters. However, data accumulated from that area since have confounded that earlier interpretaion and leave as equally plausible the hypothesis that the whales simply make inshore-offshore movements at different seasons in different areas.

From whaling records and scant observations prior to 1980 it was written often that though Baird's beaked whales were certainly present off both Central and Northern California from June through October, there were apparent peaks in numbers off Central California in July and October. These peaks were thought by some to correspond to long distance north-south migrations. Baird's beaked whales were seen or caught off Washington between April and October and were encountered with some regularity off British Columbia from May through September, but with peaks in August.

During three years of extensive aerial surveys of California waters within about 100 nm of shore north of Point Conception, researchers saw Baird's beaked whales in all months except December, January and April. Further, there was no evidence that animals moved into the study area(s) from either north or south, leading to speculation that the species spends winter and spring far offshore then moves onto the continental shelf from June through November, taking advantage of seasonally warm waters.

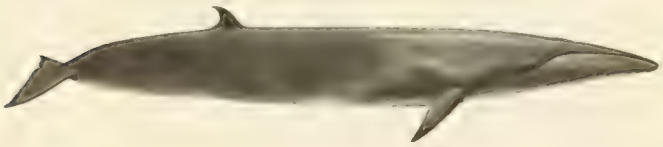
During the years of observation (1980-83) Baird's beaked whales were seen with equal frequency in water deeper than 1000 fms (27% of the effort, about 25% of the animals) and in water shallower than 1000 fms (73% of the effort about 75% of the animals). This is contrary to evidence from the western North Pacific and Aleutian islands, where Baird's beaked whales have been found largely in the deep ocean or in deep canyons near the continental shelf, in water over 1000 fms deep, and are rarely reported in continental shelf waters.

There is far less systematic evidence on which to base conclusions about Baird's beaked whale distribution and movements in the SCB and immediately adjacent pelagic waters. We are aware of 17 sightings of the species in those areas from 1952 througth 1978. At least one of those occurred in each month except January and May. Thirteen of those records are from the deep waters off the Patton Escarpment. Two were along the escarpment, in August. The only two within the SCB are a sighting in July just south of San Nicolas Island (in deep water of the San Nicolas Basin) and one in January off Pyramid Head, San Clemente Island (also in deep water). This and the absence of known strandings on the Southern California mainland or on the Channel Islands has lead us in the past to list Baird's beaked whales as a deep water species unlikely to occur in the SCB. However, with the evidence of inshore-offshore movement off Central and Northern California we will not be surprised at sightings over the SCB in coming years. The sizes of eastern North Pacific populations are unknown, but in the absence of sustained major harvests in the area or of catches in the past approximately 15 years, stocks are assumed to be healthy.

FIGURE 15. A group of Baird's beaked whales sighted at latitude 30°01.4′ Longitude 117°56.6′. (Above, photo by John E. Law.) An adult male Baird's beaked whale on the ramp of a whaling station. This species was represented in catches by shore-whalers in California, British Columbia, and southern Alaska. (Right, photo courtesy H. Omura.)

Other Species Reported

There are four other species of great whales in the northeastern Pacific. One, the bowhead whale, *Balaena mysticetus* Linnaeus, 1758, is an arctic species and a true pagophile, its ecology closely tuned with the advance and retreat of the arctic icepack. Except for the one exceptional stranding in Osaka Bay, Japan some years ago, the species is unknown south of the Okhotsk Sea or central Bering Sea, so it is not discussed here. The other three species are not likely to occur in the SCB or CINMS, except perhaps rarely, owing to their more tropical or pelagic distribution or to their current depleted condition in the northeastern Pacific. Therefore, the three are discussed here only briefly.



Sei whales, *Balaenoptera borealis* Lesson, 1828, appear in general to prefer subtropical to cold temperate pelagic regions and to avoid polar and shallow coastal waters. There are three putative stocks in the North Pacific distributed in adjacent areas divided at longitudes 155°W and 175°W. Prior to exploitation, the size of the aggregate populations was an estimated 42,000 to 82,000 whales. Although a few were killed by shore whalers in the first 40 years of the 20th century, mostly in Alaska, intensive and widespread whaling involving this species did not begin until 1945. Between that year and 1962 nearly 11,000 sei whales were killed in the North Pacific. From 1963 through 1974 at least another 43,719 were taken in the North Pacific (including the Bering Sea). Whaling reduced the populations of sei whales from an estimated 50,000 in 1963 to a low of 20,000 in 1974. At present, the populations are thought to be recovering, but there is no reliable estimate of current population size.

In winter (December through March) eastern North Pacific sei whales are said to be widely but sparsely distributed along and seaward of the continental shelf from at least Piedras Blancas (ca. 35-30°N) south at least to the Revillagigedos islands and perhaps farther south in the eastern tropical Pacific. At this season, there are apparently only small numbers of sei whales near the westernmost fringes of the SCB. In summer, however, the distribution of sei whales shifts northward and includes waters from about the California/Baja California border throughout the Gulf of Alaska. At this season, major concentrations are reported to assemble "outside the channel islands". Thus, there is near the SCB a year-round source of vagrants for the waters in and near the CINMS. Even so, we are aware of only two confirmed sightings of this species in the SCB – totaling five animals – both in deep water southwest of San Clemente Island.

Because of the superficial similarities in appearance between fin and sei whales it is possible that some sightings of the latter have been misrecorded as fin whales. However, the absence of confirmed strandings from the area by specialists and the dearth of sightings, despite extensive work in the SCB in the past 15 years, suggests that sei whales occur in the area only rarely.

Bryde's whales, *Balaenoptera edeni* Anderson, 1878, also resemble both fin and sei whales. In fact, until recently, even whalers failed to distinguish between sei and Bryde's whales in their records. Therefore, some records of sei whale occurrence may also have been incorrectly logged. Bryde's whales ordinarily occur in warmer waters well west or well south of the SCB. Two forms are thought to exist in the North Pacific – an offshore form found in the warm currents of the south central (to latitude 43°N) and northwestern (to latitude 45°N) Pacific and a smaller inshore form found nearer the coast on both sides of the Pacific. The offshore form does not appear to be distributed, routinely, very far into eastern North Pacific waters. We are aware of only a handful of confirmed sightings near the Continental Shelf of Southern California. All these are from over 200 nm west of the Channel Islands, made during special USNMFS cruises south of latitude 28°N. There is only one confirmed record of Bryde's whales in the SCB, that of a solitary whale photographed off La Jolla in 1954. Despite recent speculation that the species might tend to wander into the SCB more frequently during periods of exceptionally warm waters, there have been no confirmed records for 30 years.

Bryde's whales are known to have been killed in waters off Mexico in the 1920s and 1930s and may have been involved in other whaling for "fin" whales in which little care was taken to distinguish among similar species. However, in the absence of any heavy exploitation the coastal stock in the eastern North Pacific is considered to be "stable at the carrying capacity of its range."

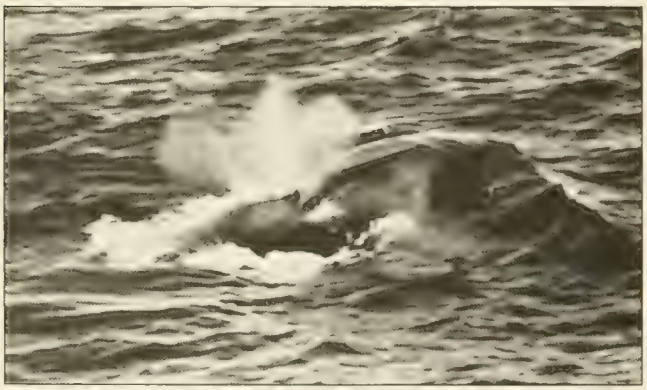


FIGURE 16. We know of only two confirmed records of sei whales in the SCB (both west of Cortes Banks in September 1977), although major concentrations have been reported to assemble in summer outside the Channel Islands. The absence of records may relate to the difficulty in positively distinguishing among sei, fin and Bryde's whales. (Photo by F. S. Todd.)

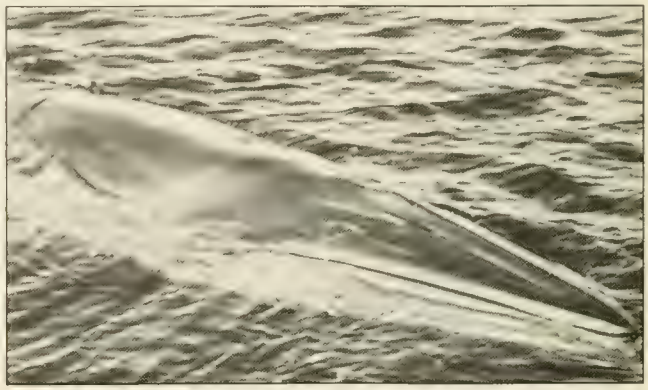


FIGURE 17. Bryde's whales habitually occur well west or south of the SCB. The only confirmed record near the CINMS is that of this animal photographed off La Jolla in 1954. (Photo by F. Morejohn, from Leatherwood et al., 1982, Figure 39a.)

Right whales, *Eubalaena glacialis* (Borowski, 1781), are the most endangered of the world's whales. A prime quarry of yankee whalers everywhere, right whales were hunted relentlessly in the seventeenth, eighteenth and nineteenth centuries. In the North Pacific, such hunting was most intense in the Bering Sea, north temperate North Pacific and Gulf of Alaska, but, as Scammon reported, some right whales were taken "from February to April as far south as Bahia Sebastian Vizcaino and near Cedros Island". We have located further unpublished records, from 19th century whaling logs, which document sightings and chases of right whales east of Guadalupe Island in April of 1856. Collectively these few records demonstrate that before the populations were severely depleted by whaling, right whales once occurred from at least as far south as central Baja California north to Arctic waters. A few were encountered and killed by shore whalers operating from San Diego Bay in the years 1850-1870. Other sightings and cathes in the eastern North Pacific, as plotted by Maury, Townsend and others, were mostly in the Gulf of Alaska and northern North Pacific, tending to be progressively farther seaward as one moves south of most important whaling grounds. Movements of right whales between summer and winter grounds, including those off Baja California, presumably placed some right whales, at least seasonally, in or near the SCB and CINMS.

By some accounts, right whales may never have been very abundant in the northeastern Pacific. According to Scammon, by 1874 they were already considered rare and sightings and takes were exceptional. Nevertheless, whalers, operating from yankee whale boats, shore stations and, later, pelagic fleets continued to take right whales whenever they found them until the species was protected by international convention in 1936. We know of ten right whales taken from the eastern North Pacific and southern Bering Sea after 1935 – one "accidentally" killed in 1951 off British Columbia by Canadian-based shore whalers and nine killed in waters off the Alaska Peninsula and eastern Aleutian Islands by Japanese whalers operating under special permits between 1956 and 1968.

For the eastern North Pacific south of latitude 55°N there are few records of right whales from this century: one killed in 1924 near the Farallon Islands, one stranded in 1916 on Santa Cruz Island, and 35 sightings representing a total of 71 individuals. Among these last are two observations in the SCB, solitary whales headed southbound off La Jolla in March 1955 and in the eastern Santa Barbara Channel in April 1981. This more recent observation is particularly exciting, especially considering the apparently desperate status of the American stock of right whales (there are two other apparently isolated stocks of right whales in the North Pacific, the Asiatic-Pacific Ocean and Asiatic-Okhotsk Sea). There are believed to be no more than 200, perhaps fewer than 80, right whales in the entire North Pacific. Most of those are in the Okhotsk Sea. This has prompted the IWC to write that ". . . apart from the remnant of the Okhotsk Sea stock . . . the continued existence of viable stocks of right whales in the rest of the North Pacific is in doubt." Any stragglers from the remnants of the American stock using waters south of Point Conception would be expected in the SCB primarily in winter and early spring months.

FIGURE 18. North Pacific right whales are probably the rarest and most endangered cetaceans in the world. This surprising sighting east of Anacapa Island in April 1981 is one of only three records of the speices in the SCB in this century. (Photos by John Strickley.)

MEDIUM-SIZED CETACEANS (to 13 meters maximum length)

This section includes one baleen whale, the minke, and eight toothed whales. Of these latter, only three are seen in significant frequency in the SCB. The others are rarely seen or positively identified in the area.

Residents and Common Migrants

Minke Whale
Balaenoptera acutorostrata Lacépède, 1804

Although the minke whale has a world-wide distribution, because of its small size it was not actively hunted by commercial whalers in most areas until the reduction in populations of larger, more valuable, species (such as right, bowhead, blue, fin and sei whales) required a shift in whaling focus. In the North Pacific, minke whales were killed, historically, in very small numbers by natives of the Pacific Northwest of North America, especially those at Cape Flattery, Washington. Minke whales began to be exploited in the coastal waters of Japan several centuries ago. Whalers used the traditional multiple boat driving and killing methods employed for the larger species. The Norwegian method of whaling using small catcher boats, introduced to Japan in about 1890, was used to take minke whales, but they were not the primary species pursued and did not, until recently, become the object of a focused fishery in Japanese waters.

Following the introduction of modern catcher boats in Japan in the 1920s, the coastal fishery there expanded. Russian pelagic whaling fleets began taking minke whales in 1933 off the east coast of Kamchatka, in the Bering Sea and in the Arctic Ocean. Japanese pelagic vessels began exploiting minke whales in the Northwest Pacific in 1930. The annual catch in this last fishery increased slightly through the early 1950s, after which it stabilized at about 400 whales.

The Republic of Korea has used small shore-based catcher boats to harvest whales reported as minkes year-round in the waters off Korea since the late nineteenth century. The catch in that area increased gradually from 170 in 1962 to 396 in 1969; 715 were taken in 1970; between 1971 and 1980 the annual catch fluctuated between 500 and a maximum of 1,033. Between 1954 and 1982 at least 22,746 minkes were killed by Japanese and Korean whalers in the Northwest Pacific.

FIGURE 19. Minke whales, the sharp-headed finner of whaling literature and the smallest of the rorqual whales, are reportedly relatively common in the SCB. (Photo off Dana Point, April 1981, by B. S. Stewart.

Along the Pacific coast of North America, minke whales were rarely killed (or reported killed) by commercial whalers. Two were taken off British Columbia in 1923 by a commercial shore-based fishery and a few were taken by shore whalers operating from Akutan, Alaska between 1912 and 1937.

The IWC currently recognizes two stocks of minke whales in the Northwest Pacific: the Okhotsk Sea/West Pacific stock and the Sea of Japan stock, including the Sea of Japan, Yellow Sea and East China Sea. Minke whales in the eastern North Pacific may also exist as separate stocks, but there is at present insufficient information to define populations or to describe movements and mixing.

The Sea of Japan stock is being exploited by Japan and the Republic of Korea. The People's Republic of China discontinued whaling in 1981. Based on analysis of catch-per-unit-of-effort and historical catches of minke whales, the size of the Okhotsk Sea-West Pacific stock was estimated in 1981 to contain 17,000 to 28,000 animals. Quotas of 3,634 and 1,678 were set for the Sea of Japan stock and the Okhotsk Sea-West Pacific stocks, respectively, for the period 1981-1984. The remaining North Pacific stocks have been protected from whaling because estimates of stock size (original or current) have not been available for them.

Because modern shore whaling stations in western North America neither routinely hunted minke whales nor noted sightings of them on the whaling grounds, little was known until recently about even such rudiments of this species' natural history as distribution. Recent sightings programs in the Bering Sea and Gulf of Alaska and off the coast of northern, Central and Southern California have shown that minke whales are present in these areas, occurring in shallow shelf waters as well as in deeper areas, far from shore.

In the northeastern Pacific, in general, minke whales range from the Chukchi Sea, near Point Barrow, Alaska, south at least to the Revillagigedos Islands, Baja California, Mexico, and are sighted occassionally in the Sea of Cortez. Sighting records and repeat observations of photo-identified individuals in northern Puget Sound suggest that some whales may reside there year round. By contrast, the seasonal variablitiy of sightings in other areas has prompted the hypothesis that some minke whales are migratory, moving north through coastal waters in spring and summer and south, farther offshore, in autumn and winter. There are, however, neither tagging data nor other unequivocal evidence of such movements.

Minke whales have long been known to occur off Central and Northern California. Until recently, however, sightings were not sufficiently numerous to suggest any patterns there. However, results of recent extensive aerial surveys (1980-1983) demonstrated that minke whales were present in those areas in all seasons but were most abundant in summer and early autumn, at which time they were relatively common.

Results of aerial and vessel surveys and other observer programs spanning some 15 years show that minke whales are present in the SCB throughout the year. They are often seen within a few miles (especially on the leeward sides) of San Miguel, Santa Rosa, Santa Cruz and Anacapa islands and have been reported from other widespread localities. Some workers have interpreted seasonal variations in numbers of whales reported as evidence of migrations into the SCB during spring and summer and movement of some of the population out of the area in autumn and winter. However, given that minke whales are difficult to see and that weather conditions in autumn and winter are not generally as good as at other times of year, we remain skeptical about such interpretations. Minke whales leaving Alaskan and other northern feeding areas in autumn could reasonably be expected to be on southern grounds in winter and spring months. Their tendency to occur alone or in groups of three or fewer in southern waters and in larger groups in northern waters compounds the problem of detecting them on the southern grounds.

In the North Pacific, minke whales have been noted to feed on euphausiids, copepods, sand lance and herring. There is little information available on breeding biology in the eastern North Pacific, but at comparable latitudes in the western Pacific breeding occurs from December through March and calves are born approximately ten months after conception.

Strandings of minke whales have been reported from Northern (three whales between 1966 and 1974 along the Humboldt County coastline), Central (one in Morro Bay in 1959) and Southern (one near Santa Barbara in the late 1970s, one on Santa Catalina Island in 1967, and two farther south near Long Beach and San Diego in 1982 California. In addition, we found scattered pieces of minke whale baleen on beaches in Pyramid Cove, San Clemente Island, in June 1973.

FIGURE 20. A minke whale stranded at Santa Barbara. The subtleties of the species coloration and the white baleen are clearly detectable. (Photo by S. Anderson from Leatherwood et al., 1982, Figure 110 top.)

Pilot Whale

Globicephala c. f. *G. macrorhynchus* Gray, 1846

Pilot whales, also known as potheads – because of the bulbous forehead – and blackfish – because of the largely black coloration – are well known because they have been exploited in local fisheries in widespread locations for many years, they have had a long and successful history in aquarium displays and shows, and they tend to concentrate, at least seasonally, on important fishing grounds, particularly those for squid. The common name most often used for the species derives, in fact, from the frequent common occurrence of whales and fishermen on fishing grounds and the resulting, often quoted, misperception that the whales "piloted" the fishermen to the location. Pilot whales are particularly well known in the SCB as they are often seen on squid grounds off the heavily populated Los Angeles coastline and on the popular trips between coastal cities and the Channel Islands, particularly Santa Catalina and the northern islands.

There is continuing confusion about the taxonomic status of pilot whales in the northeastern Pacific, as elsewhere. It has been postulated that there may be three forms in the North Pacific overall and that at least two of them – *Globicephala macrorhynchus* and *G. scammonii* – occur in eastern waters. However, conclusive definition of pilot whale taxonomy in this area must await systematic review of specimens and data.

Whatever their affinities, pilot whales are present, but not at all common, in the Gulf of Alaska and south along the coasts of Washington, Oregon and Northern California. Shortfin pilot whales, the form we believe to be dominant in the SCB, appear to prefer warm temperate climates, and their movements north of about latitude 40°N are thought to relate to incursions of warm water. Pilot whales are abundant, at least locally, from the latitude of Point Conception at least as far south as the waters off Guatemala, and are found throughout the tropical eastern Pacific, including waters around Hawaii and other pelagic islands.

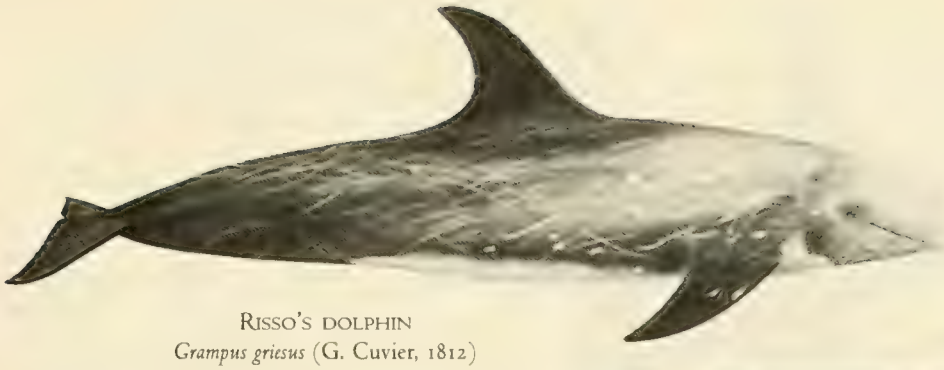
The Southern California and northern Baja California population appears to have two components. Some individuals are known to stay year-round in the vicintity of the California Channel Islands and some of the Baja coastal islands, showing a marked affinity for the coastal heads of deep submarine canyons. Others are seen much of the year in deeper waters far offshore. In late winter-early spring, when squid invade inshore waters to spawn, some of these offshore animals appear to move inshore, joining "residents" to form larger concentrations over the most active squid spawning grounds. In summer and autumn, the offshore animals abandon the inshore areas, apparently returning to pelagic waters.

FIGURE 22. Pilot whale herds often hunt in "chorus lines", swimming side by side until one animal detects food then breaking ranks to feed individually. Photo from Santa Barbara Island, April 1977 by S. Leatherwood.)

Pilot whales have been reported from the Santa Barbara Channel and waters of the CINMS in all quarters. However, here as elsewhere, numbers appear to peak in winter and spring. Though they may be seen in any part of Santa Barbara Channel pilot whales are most often encountered near Mugu and Hueneme canyons, in the Anacapa-Santa Cruz Channel, along the south shores of Santa Cruz and Santa Rosa islands, and west of San Miguel Island. Recent studies indicate that pods may maintain the same membership over long periods. Data from the 1960s and 1970s suggest that the same pods and individuals return to the same areas year after year. Intense El Niño conditions interrupted long standing patterns in the SCB in the early 1980s, during which time pilot whales were virtually absent from many traditionally important areas. But pilot whales have recently begun to return to such areas presumably as effects of the brief warming trend wane.

FIGURE 21. The pilot whale population in the SCB includes "residents", seen throughout the year and resighted year after year, and "migrants" which invade the SCB annually during the peak of the squid season. (Photo north of San Nicolas Island, April 1974, by B. S. Stewart.

FIGURE 23. Pilot whale strandings are not uncommon, on the mainland or the Channel Islands. (Photo from Cuyler Harbor, San Miguel Island, 11 September 1984 by D. Seagars.)



RISSO'S DOLPHIN
Grampus griesus (G. Cuvier, 1812)

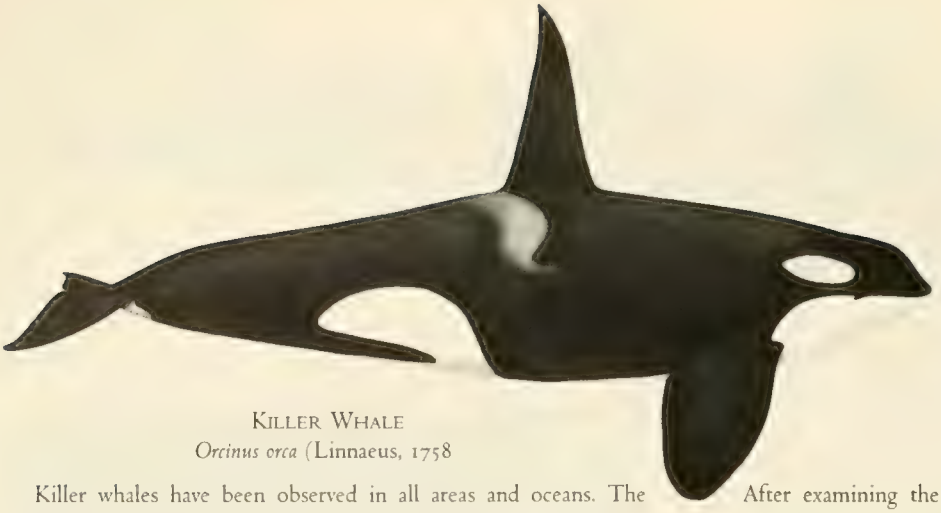
The cosmopolitan Risso's dolphin, also known as grampus, has been little studied anywhere. In the eastern Pacific it is known to occur from as far north as latitude 55°49′N in the Gulf of Alaska and as far south as central Chile. It appears to be primarily a tropical to mid-temperate pelagic species, occurring consistently relatively far offshore (beyond the 100 fathom curve). Risso's dolphins appear at present to occur yearround in offshore waters from about central Baja California northward to about San Francisco. However, movements farther north and onto the continental shelf, including the SCB, appear to be seasonal and related to changes in sea surface temperatures. The species was virtually absent from the SCB during a protracted cold period but is now present, at least seasonally, in significant numbers.

In the SCB, these large dolphins are generally seen along the continental rise west of San Miguel and San Nicolas islands. However, we and other workers have seen them occasionally closer to shore, near Dana Point, in the Santa Catalina Channel, off Santa Barbara Island, in the Santa Barbara Channel and more frequently between Santa Catalina and San Clemente islands, primarily in late winter and early spring. Risso's dolphins are almost exclusively squid eaters and their habituation of the pelagic zone wherever they occur evidently reflects that food preference. Their appearance in inshore waters has occurred when pelagic squid have been available in larger than usual quantities over the continental shelf.

Risso's dolphins seldom occur in large herds (more than 200 have been seen on occassion but the vast majority of herds are 50 or fewer and groups of about ten are most common). Wherever they occur, however, Risso's dolphins are gregarious and often assemble with other species, particularly northern right whale dolphins and pilot whales.

FIGURE 25. A group of Risso's dolphins seen from aircraft off San Nicolas Island in August 1979. (Photo courtesy Hubbs Marine Research Center.

FIGURE 24. Risso's dolphins, absent or scarce in the SCB during cold water periods, are relatively abundant when warm water currents dominate. Their movements, both local and long distance, are thought to be related to movements of pelagic squid. (Photo by P. C. Howorth.



KILLER WHALE
Orcinus orca (Linnaeus, 1758

Killer whales have been observed in all areas and oceans. The prevalent understanding of their distribution, often recounted, is that while they may be encountered virtually anywhere in marine waters world wide they are most abundant in colder waters of both hemispheres, with centers of greatest abundance within about 800km of continents. In some areas they appear to be migratory while in others they are apparently present year-round. The general patterns of distribution and movement worldwide have often been described. But for most regions there are few published details on the distribution, abundance, seasonal movement patterns and habitat use.

The eastern North Pacific is the exception to that rule. Here, killer whales are known from the Chukchi Sea south to the equator with no major hiatuses in distribution apparent. Reviews of literature and analyses of results of major observation programs have characterized relative abundance by major oceanic (eastern tropical Pacific) and coastal (Alaska) regions. Further, the dynamics of "populations" in areas from northern Washington to southern Alaska are under study and reasonably well known. These detailed population studies have been based largely on monitoring of naturally tagged individuals using high quality black and white photographs of the dorsal fin and post-dorsal-fin saddle and on examination of acoustic recordings for evidence of dialects. Such studies, begun in inland marine waters of Washington and British Columbia in the early 1970s, have recently been conducted in Southeast Alaska and southern Alaska and are being extended with less intensity to waters south of the Strait of Juan de Fuca, Washington, along the west coast of North America.

From the above studies, the current dogma is that some pods and populations of killer whales are "resident", occurring all or most of the year in relatively limited "territories" or "home ranges", while others are "transient", ranging far and therefore likely to occur only sporadically at any given site. The best described "resident" pods are known from enclosed inland marine waters with high productivity, such as those in Prince William Sound, in portions of Southeast Alaska, in the Strait of Georgia, around Vancouver Island and in Puget Sound. Transients are most often found on the outer coasts and are found in general in lesser densities overall.

Along the coast of California, killer whales are often sighted well out to sea, but some move into kelp beds and into bays and inlets, as well. They are seen frequently along the coast of Baja California, particularly near island pinniped rookeries. For that reason, one might reasonably expect to meet them frequently around the pinniped-rich areas in the SCB and CINMS. It is surprising, therefore, that there are relatively few confirmed records from those regions. A recent review uncovered only 35 confirmed sightings in the SCB, Santa Barbara to San Diego, for the decade 1974-1984. A high proportion of those were recorded from nearshore areas around the northern Channel Islands. Killer whales have been seen in the SCB in most months but with slightly higher frequency in autumn and spring.

After examining the limited data available from this area one researcher postulated that there were two subpopulations in the SCB, one operating in the region of the southern islands and adjacent mainland, the other in the vicintity of the northern islands (Anacapa, Santa Cruz, Santa Rosa and San Miguel) and the adjacent mainland, Port Hueneme to Point Conception. Another worker postulated that there were several "resident" pods and several "transient" ones in the SCB, supporting his hypothesis with a handful of photo-identified individuals resighted after the initial identification. One of us (SL) wrote some years ago that killer whales are seen infrequently in the

FIGURE 26. This male killer whale, one of seven encountered in early March 1984 off Anacapa Island, provided thrills to the passengers and crew of the *We Seven* and the *Shearwater*. (Photos courtesy of T. Donnally.)

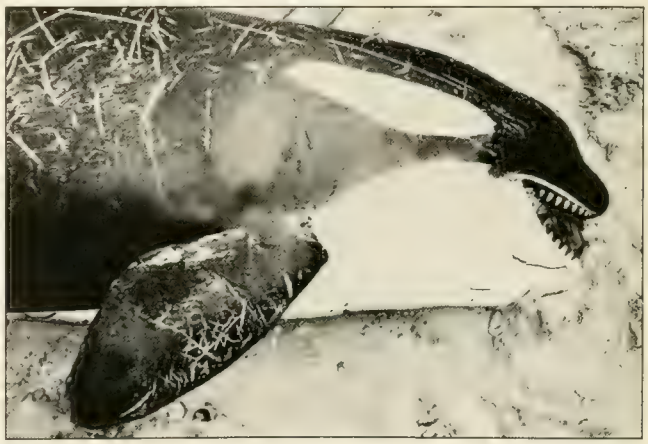
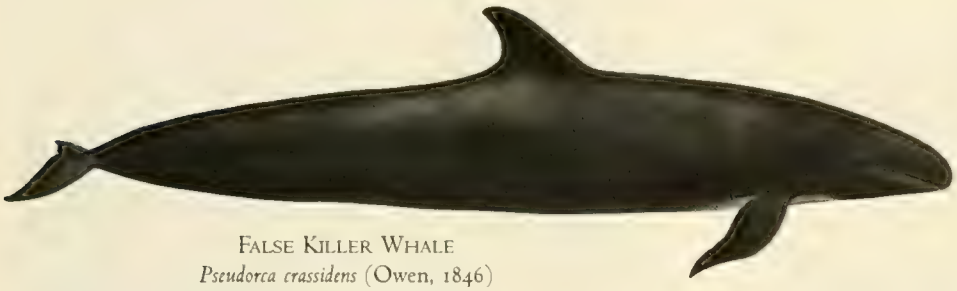


FIGURE 27. An immature (330 cm) female killer whale stranded at Willow Cove, on the southeastern side of Santa Cruz Island, about 2 June 1973. We are aware of only four such strandings of this species in the SCB since 1907, indicative of the relatively low densities occurring in and near the CINMS. Photo by W. Philbin.

SCB but that sightings often involved the same few groups repeatedly and that following the first encounter in a given area the same group was often seen there repeatedly over several weeks. For example, a pod of six killer whales containing a male dubbed as "old bent fin" was seen in 1959 (twice), 1962 (once) and 1976 (twice) in waters off San Diego and the Coronado Islands, a pod of eight remained off San Diego for about three weeks in 1982, and one male we photographed in a group of 12 off Santa Barbara in January 1981 remained in that area for at least one week, returned to the area in January 1983 and appeared off Catalina Island in February of the same year.

Therefore, although killer whales appear not to be particularly abundant in the SCB they might be met with at any time and location.

Other Species Reported



False Killer Whale
Pseudorca crassidens (Owen, 1846)

Most researchers have regarded the false killer whale as a predominantly tropical or subtropical species limited to pelagic waters. In the eastern North Pacific, these sleek, black, medium-sized toothed whales (to about 6 m) have, indeed, rarely been reported north of Baja California, where the broad transition between tropical and temperate waters ordinarily occurs. The few records that do exist are of special interest, however, as they leave open the question of whether or not false killer whales are present in pelagic temperate waters in greater numbers than generally believed.

The northernmost records published are those of a single live whale seen in Ishami Lagoon, Prince William Sound in 1983 and of one animal shot in 1937 near Olympia, Washington. There are no further published records from along the Washington or Oregon coasts and only four from Northern and Central California – a stranding in 1966 at Crescent City, two solitary whales seen live about 30 nm west of Humboldt Bay in the 1970s, and a small group we filmed in pelagic waters between Monterey Bay and Avila Bay in autumn 1982.

Figure 28. False killer whales are represented in the SCB by an apparent mass stranding on San Nicolas Island prior to 1940 and a handful of verified sightings. (Photo by S. Leatherwood.)

The situation becomes a bit more complex south of Point Conception. Between 1940 and 1960 various researchers collected a total of 9 skulls of this species in the area of Dutch Harbor, on the south east end of San Nicolas Isaland. The most recent worker involved in examining those materials interpreted them as evidence of a mass stranding, a fate not uncommon to groups of false killer whales in various locations. There are a few records of the species alive in the SCB. Herds were seen off Catalina Island in 1959 and about 4 nm off the Palos Verdes Peninsula in 1959 and 1963. A single animal was captured in the area in 1963 and held at Marineland of the Pacific. We have received reports from observers aboard seven separate albacore fishing boats that they have seen what were probably false killer whales off the Patton Escarpment and near 60 Mile Bank in late summer/autumn 1976-1982. One of us (SL) has seen herds of false killer whales at four separate locations from the 43 fathom spot, southeast of San Clemente Island, to the northern tip of Guadalupe Island. More recently (in October 1985) a herd of about 20 false killer whales was again seen off Point Vincente this time by observers on shore. This was the first sighting over the continental shelf in the SCB for 22 years, despite extensive survey effort during much of that time. As these sightings in the SCB have not necessarily occurred during warm water periods one wonders whether or not false killer whales are present in infrequently surveyed pelagic waters seaward of the SCB.

Figure 29. False killer whales seen from the beach at Point Vincente, 20 October 1985. (Photo by Kathy Bates, courtesy of D. R. McIntyre.)

Cuvier's Beaked Whale
Ziphius cavirostris G. Cuvier, 1823

Cuvier's beaked whale, the most nearly cosmopolitan of the beaked whales, is widely but sparsely distributed throughout the tropical and temperate oceans of the world. It is the most widely distributed and frequently sighted beaked whale in the northeastern Pacific, although knowledge of its distribution in this area, as elsewhere, is based primarily on stranding records, more than 40 of which exist for the west coast of North America. In the northeastern Pacific in general there are records from the western Aleutians (winter and summer) and southern Bering Sea (mostly spring and summer) south to the equator (year-round). In Southern California stranded whales have been reported from Santa Catalina, San Nicolas and San Clemente islands, and from mainland sites in Pacific Beach, La Jolla, Del Mar, Newport Beach and Malibu. Such stranding records show no clear seasonal or geographic patterns. Neither do the thirty or so sighting records from Southern and Central California, except that most are from pelagic waters and that sightings are rare in continental shelf regions, even where survey effort has been extensive. We have seen Cuvier's beaked whales on both coasts of San Clemente Island, west of San Nicolas Island and in the San Nicolas Basin in April, June and September, respectively, and others have reported seeing them from near Catalina Island and near Tanner and Cortez Banks. It is our impression from all information available to date that Cuvier's beaked whales are most likely to be encountered near the western boundaries of the SCB and that they are not likely to be found routinely in any except deep water portions of the CINMS.

FIGURE 30. A Cuvier's beaked whale breaching off the northwestern Baja coast in April 1973. (Top, photo by S. Leatherwood.) Though there are only a handful of confirmed sightings of this species in the SCB it appears, from stranding records, to be the most common beaked whale in and near the area. Right, photo by John E. Law

FIGURE 31. An approximately 6 m Cuvier's beaked whale stranded at La Jolla on 12 June 1959. (Photo from the C. L. Hubbs collection courtesy of L. Hubbs.)

Beaked Whales of the Genus *Mesoplodon*

Five species of mesoplodonts are known from the eastern North Pacific, mostly from stranding records, as beaked whales are rarely seen and positively identified alive at sea. Of those species, two are unknown from waters in or near the SCB – Stejneger's beaked whale, *Mesoplodon stejnegeri* True, 1885, is not reported from south of Monterey and is apparently restricted to cold temperate and subpolar waters; and Blainville's beaked whale, *M. densirostris* (Blainville in Desmarest, 1817), is known along the North American west coast only from single strandings in San Mateo County and San Francisco and is apparently ordinarily restricted to pelagic southern temperate and tropical waters. The other three species warrant only brief mention here, as they are not likely to be seen at sea except by the most diligent and persevering observers, or identified correctly at sea or on the beach except by specialists.

Hubbs' beaked whale, *M. carlhubbsi* Moore, 1963, has been found stranded from British Columbia to San Diego, California and has been postulated to live in association with the confluence of the subarctic and California Current systems, rarely if ever ranging north of the former's influence or south of the latter's. If this is in fact the case, Hubbs' beaked whales from the southern portions of the species' range in the eastern North Pacific might well be present in or near the SCB and CINMS at any time of year that the California current is flowing strongly near shore.

The ginkgo-toothed beaked whale, *M. ginkgodens* Nishiwaki and Kamiya, 1958, is known in the northeastern Pacific from only two records, one from Malarimo Beach, Scammon's Lagoon, Baja California and a second from Del Mar, California. The species appears more common in the warm temperate and tropical waters of the western North Pacific and Indian oceans.

Hector's beaked whale, *M. hectori* (Gray, 1871), is best known from the Southern Hemisphere. In recent years its presence in the SCB has been confirmed by four strandings on Southern California beaches, in the months of May, September and December, and sightings near Catalina Island in July and 50-75 nm west of San Diego, near San Clemente Island, in September.

All species of beaked whales are known to feed on squid and are generally believed to be inhabitants of the high seas. Sightings of unidentified beaked whales of the genus Mesoplodon have been mostly over the Santa Rosa-Cortez Ridge, near Rodrigues Sea Mount and west of the outer Channel Islands. It is not known whether forays of these species onto continental shelf waters of the SCB are common or exceptional, but it is the present working hypothesis that no beaked whales are likely to be seen in the SCB except in deep water regions.

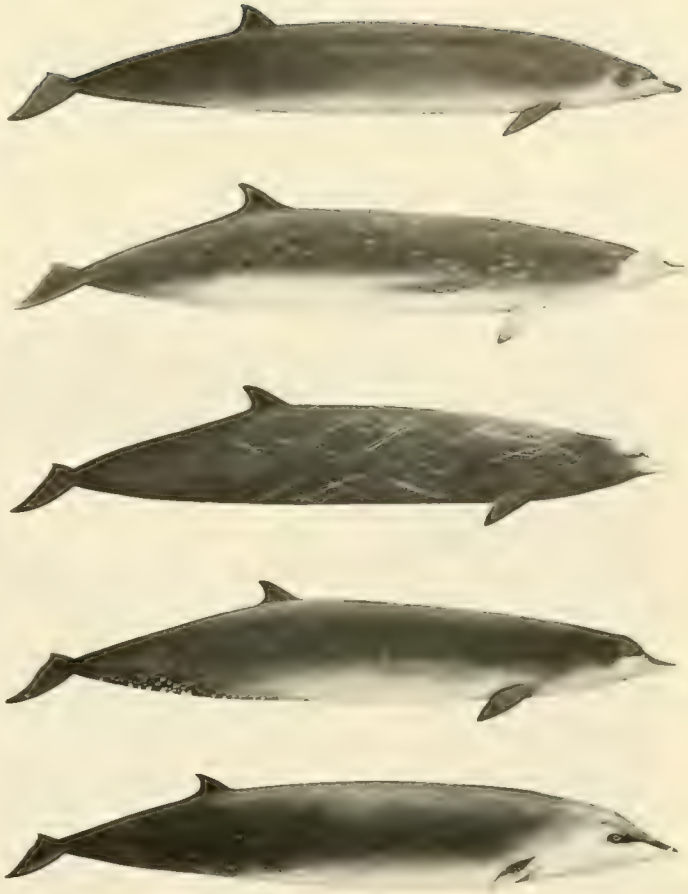


Figure 32. Stranded beaked whales, probably Blainville's or Hubbs' beaked whales, get some close up attention. Except for adult males, in which the emerged teeth are helpful clues, beaked whales are difficult or impossible for the novice to correctly identify. Even specialists often have to examine the prepared skull. (Photos by P. C. Howorth.)

SMALL CETACEANS (Less than 4 meters maximum length)

This group includes most of the cetaceans known commonly as dolphins or porpoises. Ten such species are reported from waters in or near the CINMS, five as year-round residents or regular seasonal visitors and five as vagrants, extra-limital strays or rarely occurring individuals difficult to detect or positively identify.

Residents and Common Migrants

Dall's Porpoise
Phocaenoides dalli (True, 1885

In the northern North Pacific Ocean, the endemic Dall's porpoise is the most frequently encountered and probably the most abundant small cetacean. It is distributed widely in cool temperate to subpolar waters, from the latitudes of central Baja California on the east and southern Japan on the west, north to the central Bering Sea, including the eastern Sea of Japan, the sea of Okhotsk, the Gulf of Alaska, and inland marine waters of Washington, British Columbia and Alaska.

The current population has been estimated at between 0.79 and 1.73 million animals, although a more conservative minimum estimate of 580,000 recently reported apparently accounts for biases in data used to derive the former estimates. The only direct commercial harvest of Dall's porpoises is a traditional coastal harpoon fishery in Japan which accounts for annual harvests of about 6,000 animals. This species is, however, killed incidentally in the Japanese high seas and land-based drift net fisheries for salmon, which have operated in the North Pacific and Bering Sea since 1952. Although most of this incidental mortality occurs in the western half of the North Pacific, some occurs in the United States' waters of the eastern North Pacific. Accurate data on mortality are unavailable, but estimates indicate that between 2,230 and 20,000 porpoise have been entangled in gill nets and drowned annually during years of greatest fishing effort. These figures are alarming to conservationists and have been the catalyst for international negotiations between Japan and the United States about the future of the fishery. There are few records of Dall's porpoise being caught in U.S. fisheries. However, the increased use by U. S. fishermen of various kinds of gill nets along the Pacific coast of North America has increased the mortality of some coastal cetaceans, most likely including Dall's porpoises.

Although the Dall's porpoise is primarily a cold-water animal, its range does extend south into Southern California, and even to Ballenas Bay in Baja California. In winter we have frequently seen them at a variety of locations in the Santa Barbara Channel, near Pt. Mugu, on the south and west coasts of the northern Channel Islands and in open water north of Santa Barbara and San Nicolas islands. We have also seen them occasionally in the company of gray whales near Santa Barbara Island, in the San Pedro Channel, near Santa Catalina Island and near San Clemente Island. A few Dall's porpoises have stranded at San Miguel Island in recent years. Other researchers have reported Dall's porpoises to be seasonally common in some years near San Miguel, Santa Rosa, Santa Cruz and Anacapa Islands and near the Santa Rosa-Cortes Ridge. Unpublished evidence available to us for this review supports the hypothesis that while numbers of Dall's porpoises in the SCB and adjacent waters of northwestern Baja California increase in winter and spring there are small numbers of year-round residents, at least around Santa Cruz and Santa Rosa islands. They are frequently encountered on trips from Ventura and Santa Barbara to Anacapa, Santa Cruz and Santa Rosa islands.

Dall's porpoises usually occur in small groups (less than 20) although on a few rare occasions groups of over 200 have been seen in the SCB. Dall's porpoise occur only rarely in mixed species aggregations in the SCB, although further north they are often seen in the company of harbor porpoises, particularly in the deep fjords along the South coast of Alaska and in Prince William Sound. Although they may often occur nearshore in northern waters, they generally occur farther offshore (usually beyond the 100 fathom curve) in southern areas, except where deep canyons approach the coast, such as in Monterey Bay off Pt. Mugu and near La Jolla, California.

Little is known about the reproductive biology of the Dall's porpoise. Two calving periods (winter, February through March; summer, July through August) have been reported for portions of the eastern North Pacific. Most recent evidence, however, suggests that in the eastern Pacific parturition occurs throughout the year. Fetuses have been taken from female Dall's porpoises in winter and spring months near Monterey Bay, the Channel Islands and San Diego. Young, nursing Dall's porpoises have been found stranded along the California coast in February and July and newborn have been seen in Monterey Bay in January and August and near Santa Catalina Island in February. The calving interval is one year, on average, but the gestation and lactation periods are not known. Some segregation of the animals in Monterey Bay seems to occur, with juveniles found close to shore and larger adults well offshore. In offshore areas there may be further segregation, with pregnant and lactating females being distributed farther north than males and non-parous females.

Dall's porpoises apparently feed at night and depend to some degree on the deep scattering layer. Based on studies in Monterey Bay, Dall's porpoises are believed to be inactive during most of the day, perhaps sleeping intermittently, and resuming active feeding in late afternoon. In Southen California waters, the most common prey of Dall's porpoises are lanternfish, squid, and small schooling fishes such as anchovy, hake and jack mackerel. Apparent shifts in abundance and distribution of Dall's porpoises off Southern California (southward and inshore in autumn, especially near the northern Channel Islands, and northward and offshore in late spring) may be largely due to increased availability of these prey species as well as to reduced water temperature.

FIGURE 33. A Dall's porpoise on the bow of a research vessel near San Miguel Island, January 1984 (top) and off Point Conception, April 1980 (bottom). Some Dall's porpoises appear to be resident around the northern Channel Islands and may be seen at any time of year. (Photo by S. Leatherwood (top and G. Friedrichsen (bottom).)

PACIFIC WHITE-SIDED DOLPHIN
Lagenorhynchus obliquidens Gill, 1865

The Pacific white-sided dolphin is one of the most widely distributed delphinids in the eastern North Pacific and may be the most abundant delphinid in temperate portions of that region. There are two forms or ecotypes: a smaller form found from about the California/Mexican border northward and a larger form found from about Point Conception southward. The two can be differentiated only by skeletal features and body proportions.

FIGURE 34. Pacific white-sided dolphins have also been called Pacific striped dolphins, because of the "suspender" stripes on the back. White sided dolphins are eager bow riders. (Photo off Anacapa Island, 20 January 1985 by S. Leatherwood.)

From an extensive review of all data available on the species we concluded that east of longitude 180°W these gregarious dolphins occur from about latitude 20°N (just south of the southern tip of Baja California) to latitude 61°N (Valdez, Alaska). They are found in pelagic waters, over the continental slope and shelf, and in some inland marine waters of Washington, British Columbia and Southeast Alaska. They appear to be continuously distributed across the temperate North Pacific.

Pacific white-sided dolphins sometimes come very close to shore in Monterey Bay, Vizcaino Bay and along the explosed coasts of Southern California. Less frequently, they enter Magdalena Bay and the entrances to Puget Sound, Queen Charlotte Sound and Southeast Alaska. These dolphins have been seen and photographed recently on Gorda Banks, in the Cerralvo Channel and around Isla Espiritu Santu, all in the Sea of Cortez, though they are apparently not common in those regions.

In the areas of most intensive observations (latitude 20°N to 34°N on the Pacific coast) the species has been observed mainly shoreward of the outer margin of the California Current, suggesting that it is principally an inhabitant of rich upwelling waters, especially near the heads of deep ocean canyons. There have been a few sightings in water as shallow as 10 fms, especially off San Diego, Santa Monica and Santa Barbara in winter, but the species seems to prefer deeper water. White-sided dolphins are encountered widely in continental shelf, continental slope and offshore zones. The species is a common inhabitant of the SCB, where it appears to occur in inshore waters from November through April and farther offshore from May through October. Herds have been reported near Santa Rosa and Santa Cruz islands and around the outer Channel Islands in summer and autumn. We have commonly seen them: at widespread locations in the Santa Barbara Channel,

FIGURE 35. White-sided dolphins are a not uncommon sight in the CINMS. This herd was encountered near Anacapa Island, seen in the background. (Photo by H. Leone courtesy of C. Pillsbury.)

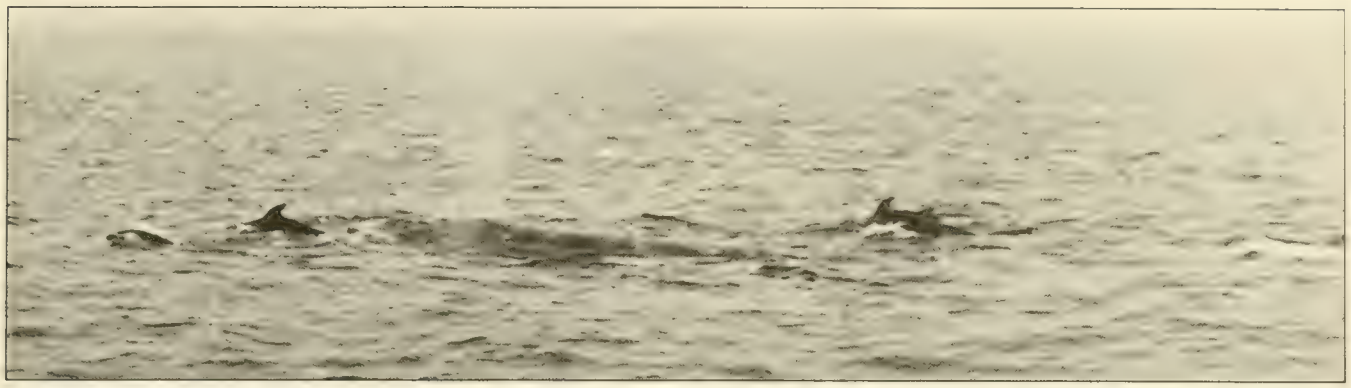


FIGURE 36. White-sided dolphins frequently ride on the pressure wave of migrationg gray whales. (Photo off Anacapa Island, February 1985 by S. Leatherwood.

within several miles of Anacapa and Santa Cruz islands on both coasts, west and south of San Miguel Island, around Santa Barbara, San Nicolas and San Clemente islands, in the San Pedro Channel and near the Coronado Islands. During the past several years we have also found stranded white-sided dolphins at San Miguel Island.

Within their broad range, Pacific white-sided dolphins appear to fluctuate in abundance seasonally. Earlier researchers speculated that such fluctuations were evidence of shifts in population centers off Northern California, in the SCB and off Baja California's west coast. We have been unable to unequivocally demonstrate migration in any area, although observed peaks in abundance suggest regular seasonal influxes into waters north of 40°N in spring and summer and between 25°N and 30°N in autumn.

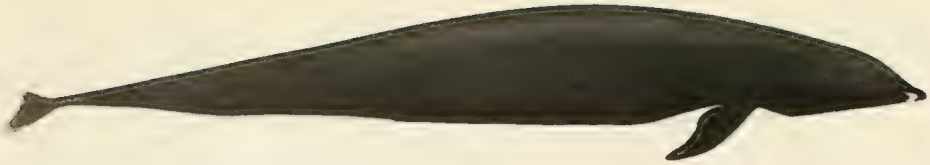
Apparently the only two areas in the Northeast Pacific in which observed distribution patterns are clearly not an artifact of sampling effort are the waters off Baja California and those in the SCB. Evidence for seasonal use is most convincing off Southern California, where peak numbers occur inshore from November through April and lesser numbers for the remainder of the year. It has been suggested that such movements are related to changes in prey distribution and water temperature. Northern anchovy, Pacific whiting (hake), and market squid appear to be the most frequently consumed prey of white-sided dolphins. These dolphins apparently do most of their feeding at night in the epipelagic and, to a lesser extent, mesopelagic zones. White-sided dolphins are, however, also known to eat sanddab, eulachon, night smelt, juvenile rockfish and plainfin midshipman. These observations suggest that white-sided dolphins may be generalized predators feeding on both inshore schooling and bottom dwelling prey.

Small numbers of white-sided dolphins have been killed incidentally during commercial fishing operations for tuna, anchovy, and salmon and squid in subtropical, mid-temperate and northern temperate waters, respectively.

Among the most gregarious of eastern Pacific delphinids, the white-sided dolphin occurs in herds of up to several thousand, though groups of less than two hundred are more usual. They often intermix with herds of northern right whale dolphins, Dall's porpoises, pilot whales, common dolphins, Risso's dolphins and bottlenose dolphins and have been seen with gray and humpback whales. Female white-sided dolphins apparently calve in summer after a gestation period of about ten months; little else is known about their reproductive biology.

No population estimate is possible with currently available data. On aerial surveys in the well studied SCB, white-sided dolphins were observed to occur at a peak frequency of 1.42 individuals per nautical mile flown. In a region off Baja California they have been estimated to occur in densities of up to 0.06 individuals per square nautical mile. Based on these surveys, white-sided dolphins appear to be the second or third most abundant delphinid in Southern California waters in winter, behind common and perhaps northern right whale dolphins. The 1300 herds sighted during surveys off the Pacific coast of North America contained an average of 88 individuals; herds were significantly larger, however, in southern and northern portions than in the central portion of their range.

FIGURE 37. Three right whale dolphins (upper left) ride the bow wave with some Pacific white-sided dolphins. The two species are frequently found travelling together. (Photo by S. Stansbury, from Leatherwood et al., 1982, Figure 265 top.)



NORTHERN RIGHT-WHALE DOLPHIN
Lissodelphis borealis Peale, 1848

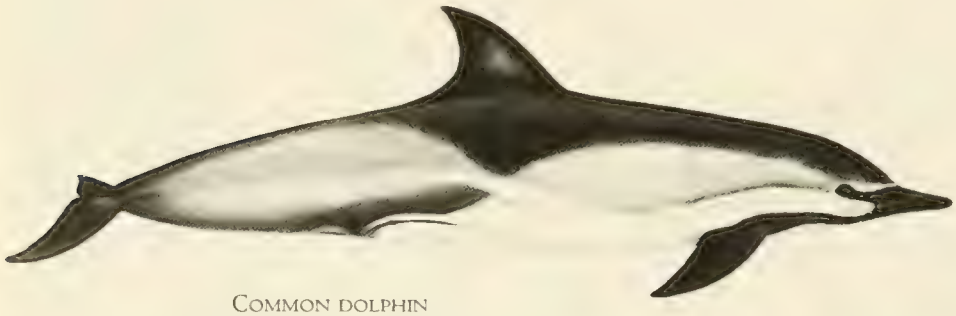
Northern right-whale dolphins are gregarious animals, often assembling in herds of 1,000 animals or more (3,000 have been reported) and often mixing with other species. They do approach vessels and ride in the bow waves, but tend to do so most frequently when accompanied by other dolphins. These handsome black and white dolphins reach lengths of about three meters and can swim 18 knots or faster for protracted periods.

The right-whale dolphin, the only finless dolphin in the northeastern Pacific, is sympatric with the Pacific white-sided dolphin, probably occurring continuously across the temperate North Pacific but avoiding colder northern and warmer southern waters. It is known from about latitude 50°N to latitude 30°N and apparently moves farther south than 30°N only during periods of intrusion of unseasonably cold waters. Right-whale dolphins are present at all seasons seaward of the continental shelf off Central and Northern California, but they are found with greatest frequency within 25 nm of the coast of Northern and Central California in winter and in the SCB in winter and spring. In those months northern right-whale dolphins are the second or third most abundant delphinid in the SCB, behind common and perhaps white-sided dolphin, and they may be met within a wide variety of locations. Right-whale dolphins are not usually found in waters warmer than 19°C and their movements overall appear related to water temperature and movements of prey. Their appearance inshore most often coincides with peak abundance of squid, a major prey item.

Sightings of right-whale dolphins are not uncommon in and near the SCB, particularly in winter. With respect to the CINMS, our observations and those reported to us have been largely along the southern and western shores of the four northern islands, but there are records from near Santa Barbara Island and in the Santa Barbara Channel in winter and spring. Some of these latter records are as close as 5 nm to the mainland. In a 1979 review of the status of knowledge about this species it was noted that strandings were not common, there having been only 35 since the species was described in 1848. In 1981 alone, however, there were 23 specimens collected from south central and southern California beaches, alone. Causes for the inshore movements which presumably resulted in these strandings are not known.

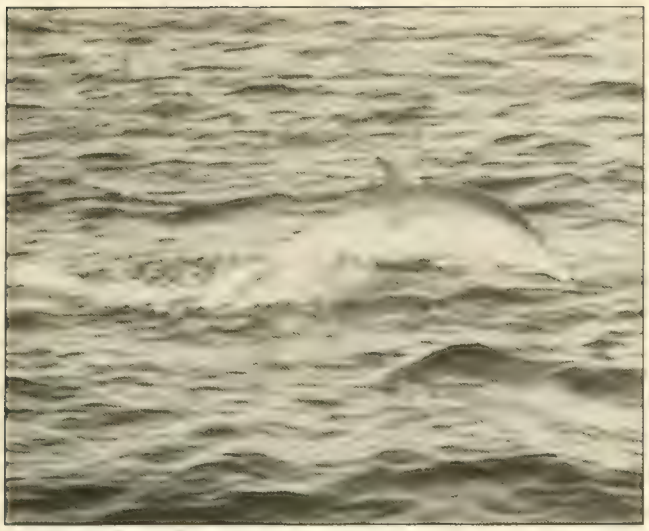
FIGURE 38. A fast-swimming group of northern right-whale dolphins off Point Conception. These sleek, finless dolphins can sustain speeds of at least 18 knots for protracted periods. (Photo by R. L. Pitman.

FIGURE 39. A northern right-whale dolphin, the only finless small cetacean in the CINMS, shown on the beach at Tyler's Bight, San Miguel Island, 27 April 1981. (Photo by B. S. Stewart.



COMMON DOLPHIN
Delphinus delphis Linnaeus, 1758

Common dolphins frequently assemble into enormous herds, a thousand or more individuals, which create a highly visible ruckus as they travel. This was likely the species that Melville had in mind when he wrote of dolphins (the huzza porpoise) "which upon the sea keep tossing themselves to heaven like caps in a Fourth of July crowd." They are often very active, with many animals leaping clear of the water at a given time. They are eager and proficient bow riders and may approach a vessel from a considerable distance to hitch a ride. Once on the bow they may ride for long periods of time. We are inclined to agree with Melville's further observation that "if you yourself can withhold three cheers at beholding these vivacious fish then heaven help ye, the spirit of godly gamesomeness is not in ye."



As the name implies, common dolphins are, indeed, very widely distributed, occuring in all oceans to the limits of tropical and warm temperate waters. There are several distinctive forms that probably deserve racial or subspecific status; some scientists recognize more than one species. In the northeastern Pacific there are at least two forms: a smaller, short-beaked form which occurs in three apparently separate populations, north of 32°N, between 25°N and 30°N off Baja and south of 15°N and a long beaked form found inside 100 fathoms north of 20°N. Where both forms are found together they do not mix. Common dolphins have been reported stranded as far north as Victoria, British Columbia and alive to at least latitude 36°N. The northernmost strandings can best be regarded as extra-limital and the few confirmed sightings north of Point Conception have generally occurred in spring and summer when fingers of warm water extend northward. Most previous records were from far offshore and usually have been presumed associated with outer margins of the California Current. In recent (1980-83) extensive aerial surveys of the coastal waters of Central and Northern California, to 100 nm off shore, there were no observations of common dolphins at all.

Within the SCB overall, common dolphins are the most abundant small cetacean at all seasons. By the most conservative estimates, populations in the SCB and adjacent waters off Baja California may number in excess of 25,000 and as many as 15,000 may invade productive portions of the SCB in peak seasons. One research team estimates no more than "125,000 animals in peak seasons" in the entire SCB.

In aerial and vessel searches of the SCB, 1968-1978 (NOSC) and 1975-78 (BLM/UCSC), more common dolphins were seen in summer and autumn than at other times of year but at no time were these animals sparse. Though some common dolphins are likely to be seen in the area of the northern Channel Islands at any season observations in those areas have been most common in spring and summer and along the outer (southern and western) coasts of the islands. From surveys and radiotelemetric studies, herds of common dolphins in the SCB were found to (a) distribute most commonly in regions of high topographic relief and avoid plains and flat areas (b) follow predictable daily patterns of assembly and dispersal (c) feed nightly on organisms of the vertically migrating deep scattering layer (DSL) (d) select for a narrow temperature range in waters less than 28°C and (e) calve in spring and autumn.

These are among the most visible and important top predators in the SCB and in and near CINMS waters. They are listed in this treatment behind white-sided and right-whale dolphins only because the former two maybe more common in waters of the CINMS, themsleves.

FIGURE 40. Common dolphins are present year-round in and near the CINMS, though their numbers peak in Spring and Autumn. The long, slim snout and vivid white side are unmistakable clues to their identity. (Photos off Anacapa Island by C. Pillsbury.

FIGURE 41. The sight of common dolphins riding the bow wave can enliven the seagoing part of any visitor's experience of the Channel Islands. (Photo from the Santa Barbara Channel by P. C. Howorth.)

BOTTLENOSE DOLPHIN
Tursiops truncatus (Montagu, 1821)

In all areas where bottlenose dolphin systematics have been studied there appear to be two ecotypes, a coastal form and an offshore form. Such is the case in the SCB and in and near the CINMS. In the northeastern Pacific, specimens of the two forms can be distinguished by differences in size at sexual maturity, tooth diameter, parasite loads and feeding habits. The living animals are, at present, impossible to differentiate to form, except perhaps inferentially by distribution. The coastal form, distributed along shore of Central America, Mexico – including the mainland and both Baja coasts – and Southern California, is found primarily within 1 km of shore and often enters the surf zone, bays, inlets, lagoons and river mouths. The offshore form is abundant and widely distributed in southern temperate and tropical waters, over the coastal shelf, slope and pelagic zones and around such oceanic islands as the Revillagigedos, Cocos, Clipperton and Hawaii. The former dolphins take a varied diet. The latter are found frequently in association with pilot whales, with which they share a diet predominantly of squid.

Both coastal and offshore bottlenose dolphins are known from the SCB, including waters in or near the CINMS. In a 1982 summary of modern records we found the coastal ecotype documented only south of southern Los Angeles County, the offshore ecotype only south of Point Conception. Their populations in United States waters of the eastern North Pacific were estimated to contain about 250 and 500-600 individuals, respectively. Within the SCB the vast majority of records had been from along the coast from Point Loma to about San Pedro or near the southern Channel Islands (Catalina, San Clemente and Santa Barbara).

In the first half of this decade, however, significant changes have been noted in the tendency of bottlenose dolphins to venture north of these formerly held limits. An anonymous publication in 1978 alleged that bottlenose dolphins occurred "infrequently . . . in offshore currents, perhaps as far north as southern Oregon" but presented no evidence. In 1982 a single animal stranded dead near Eureka, California (From available evidence this specimen was thought to be of the offshore type). One must be cautious in interpreting such strandings as evidence of range extension as the specimen(s) may have died elsewhere and simply drifted ashore. The type specimen of *Tursiops gilli* is a specimen from "Monterey" and there is a single skull dredged from inside San Francisco Bay. These two records are similarly weak bases for extending the species' range north of Point Conception. But a recent series of sightings of live bottlenose dolphins deserves more serious consideration in deliberations about geographical range.

In November 1982, bottlenose dolphins were seen and photographed 25 km north of San Pedro. Among them were individuals photo-identified in a study farther south, off La Jolla, by Larry Hansen, of NMFS. Between January 1983 and December 1985 we recorded or received reports of 31 sightings of bottlenose dolphins between Bass Rock and Carpenteria Beach, all along the north shore of the Santa Barbara Channel. During the same period the Santa Barbara Museum of Natural History noted seeing a bottlenose dolphins near Santa Barbara and U. S. Fish and Wildlife Service personel observed

FIGURE 42. Bottlenose dolphins, like many other cetaceans, can be identified by unique pigmentation and scarring patterns. These individuals were catalogued and monitored in a study of movement patterns between Oceanside and San Diego. In the early 1980s some of them moved north with the El Niño, reaching Santa Cruz and spending protracted periods along the mainland coast of the Santa Barbara Channel. (Photo courtesy of Larry Hansen NMFS/SWFC.)

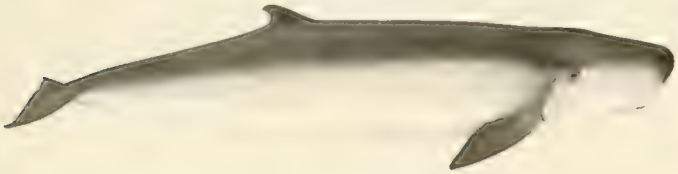
some near Piedras Blancas. In 1983, staff of the California Marine Mammal Center observed bottlenose dolphins, with Pacific white-sided dolphins, off the Farallon Islands. Of greatest interest, however, is the occurrence between October 1983 and January 1984 of some ten sightings near Santa Cruz, California. Involved were some 25-50 indivuduals, including animals known by photographs from much farther south. At least four of these "photo-tagged" animals have been seen subsequently off La Jolla, two in January and two in March 1984. Reasons for the movements have not been quantitatively demonstrated but are thought to be related to recent warming of California coastal waters, associated with a protracted "El Niño" current and resulting shifts in prey of bottlenose dolphins.

Bottlenose dolphins can be expected within the CINMS at anytime, though their use of the area and the number of animals involved may fluctuate within and among years as a function of varying environmental features. In any case, populations using the SCB and CINMS appear relatively small and, therefore, likely vulnerable to disturbance. Elsewhere, for example, bottlenose dolphins are often caught and killed accidentally or incidentally in fishing nets. Growing use of gill nets and continuing use of seine nets in the SCB is, therefore, a cause for concern as they might affect this species. Further, bottlenose dolphins from the SCB have been found to have the highest polutant levels yet measured among mammals. Though the effects of such pollutants on marine mammals are not clear, they are not likely to be beneficial to the dolphins. The high levels occurring in this species in the SCB are cause for special vigilance.

FIGURE 43. Formerly a relatively rare sight off Santa Barbara, these coastal bottlenose dolphins became regular visitors to the area west of Carpenteria Beach in 1983-85. (Photo by B. Ponce, Santa Barbara News-Press, 8 December 1983.)

Other Species Reported

Five other species of dolphin/porpoise have been reported as vagrants in or near the SCB and therefore might be expected as rare visitors to the CINMS.

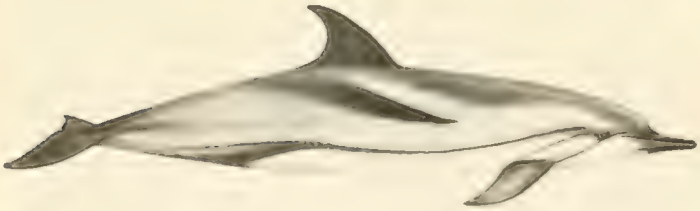


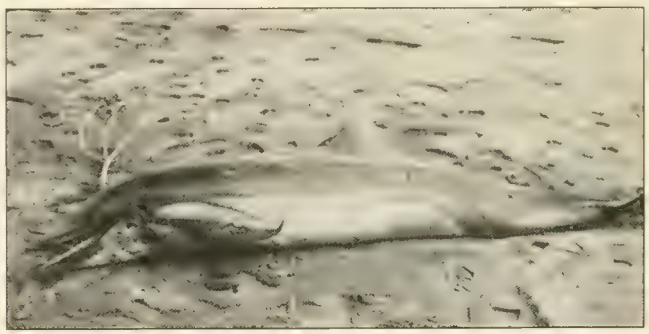
Pygmy sperm whales, *Kogia breviceps* (Blainville, 1838), have been reported from Washington south to (and into) the Sea of Cortes. Along the California coast they have stranded at Imperial Beach, Mission Beach, Del Mar, Balboa, and Cabrillo Beach. They have rarely been seen and positively identified alive (although the frequency of strandings suggests they may be more common) and it is generally believed that they remain habitually seaward of the continental shelf.

Dwarf sperm whales, *Kogia simus* (Owen, 1866) are known from south (the Pacific coast of southern Baja California) and north (San Luis Obispo County and British Columbia) of the SCB, but like the pygmy sperm whales are believed to be primarily creatures of the open sea. There are no confirmed records of dwarf sperm whales from within the SCB.

Both species of *Kogia* feed on cephalopods and shrimp. The probability that either will occur in the SCB is highest in years and seasons when pelagic squid are present in substantial numbers, as was true in the late 1970s and early 1980s; otherwise, neither is likely to be seen inshore of the continental rise.

Figure 44. Neither pygmy nor dwarf sperm whales are likely to be seen very often in the SCB. Both are secretive inhabitants of the open sea and are detected even by experienced observers only under exceptional circumstances. (Left photo of *K. breviceps* from 31°27′N, 120°04′W, 10 October 1979, by M. Graybill. Right photo of *K. simus* from the eastern tropical Pacific, 1987, by M. Webber.



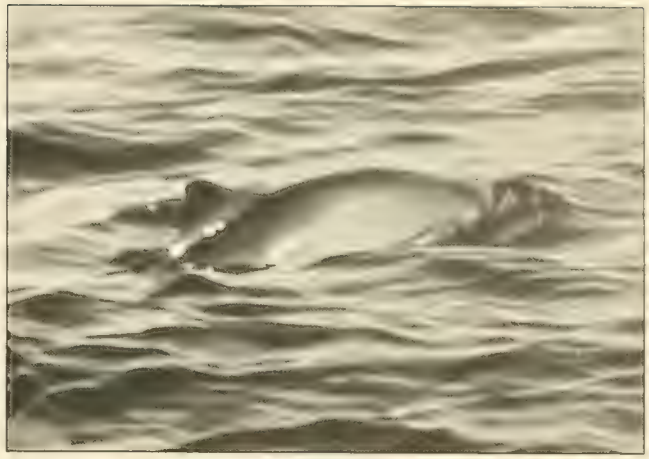


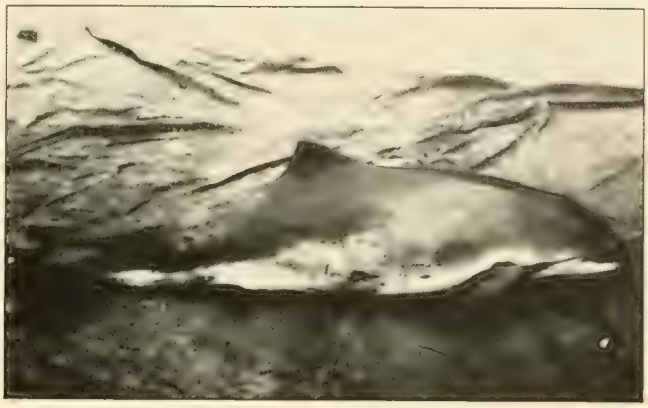
A few striped dolphins, *Stenella coeruleoalba*, have been found stranded in British Columbia, Washington, Oregon and Southern California and a few individuals of this species have been seen alive just outside the outer Channel Islands. However, sightings 1000 km due west of Los Angeles and what is known about the species' distribution from extensive studies elsewhere suggest that striped dolphins may be more abundant far offshore in warm temperate to tropical waters.

Figure 45. A striped dolphin from the eastern tropical Pacific and one stranded at Neskowin, Oregon, 28 December 1974. These dolphins are rarely seen alive or found on beaches of the temperate eastern North Pacific, generally preferring warmer waters farther south. (Photos by M. Webber (top) and by D. Beach from the files of S. Leatherwood.

The harbor porpoise, *Phocoena phocoena* (Linnaeus, 1758) on the other hand, is a shallow water inhabitant usually restricted to waters less than 50 fms and almost always to water less than 100 fms deep. They are a cold temperate/subarctic species whose normal range is well north of Point Conception. They have been only rarely reported from south of the point (strandings in Los Angeles, Santa Barbara and Ventura). No live harbor porpoises have been reported from south of Morro Bay. With such short distances between the SCB and the southern portions of the species' range, however, it might be speculated that if the population grows and a period of cooling of the ocean occurs in the SCB then harbor porpoises may venture southward, in a reversal of the trend exhibited recently by bottlenose dolphins which have moved north of Point Conception during periods of warming. At present, however, populations of harbor porpoises are depressed. The species is victimized by gill nets set in the coastal waters for a variety of fishes. In 1983, alone, an estimated 300 harbor porpoises were killed in such fisheries. With this impact the future of an already small population off California is in jeopardy.

FIGURE 46. A harbor porpoise off Seaside, California in 1973 (top) and stranded near San Francisco (bottom). This species has never been reported alive in the SCB but is represented here by at least three strandings. (Photo by J. D. Hall, top; and M. Webber, bottom.





Rough toothed dolphins, *Steno bredanensis*, have never been seen and positively identified alive in coastal temperate waters. Until recently, one of two existing records from the northeast Pacific Ocean was from Marin County. The other was from the Galapagos; so, the species has been speculated to occur over a broad range of temperate and tropical waters. Although a few more specimens have recently been collected from Central and Northern California these are believed to be extralimital strays as the growing number of sightings of live animals have been in tropical waters warmer than 25°C.

FIGURE 47. Rough-toothed dolphins have stranded north of the SCB, but this tropical pelagic species is not likely to be seen in the SCB. (Photos from the eastern tropical Pacific by M. Webber (top) and R. L. Pitman.

We have not attempted to list here all the numerous publications we consulted in researching and writing this report. Had we done so the bibliography would have been almost as long as the text. However, to assist readers who wish to learn more about cetaceans of the North Pacific in general and the Southern California area in particular we have provided a list of selected references. Most are readily available in munincipal and university libraries. Others can be found in various regional libraries of the US National Marine Fisheries Service or the California Department of Fish and Game. The rest are available in the files of Hubbs Marine Research Center or the authors of this report.

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Aids to Establishing a Sightings Network for the CINMS

Cetaceans are not easy to identify at sea, especially as they are typically seen – a distant blow, a splash or a silhouette against the horizon. Even when they are seen quite closely, many cetacean species are subtly marked and similar to one or several other species; so, even specialists must take care not to make quick judgements but rather to be attentive throughout each encounter to details which can confirm identity of the species involved.

We encourage all participants in the CINMS sightings program to undergo a period of training (viewing slide shows and participating in a series of identification quizzes), study in detail the available information on how to identify CINMS cetaceans [found in this report and such other publications as Leatherwood et al (1982), Leatherwood and Reeves (1983) and Hoyt (1984)], and develop good habits for observing cetaceans and reporting on cetacean sightings. This latter includes (a) logging each sighting with detail sufficient to allow a reviewer to confirm the identifications and (b) photographing animals whenever possible and including the photographs with the sightings reports.

As detailed field guides will not always be readily available to would-be observers, we provide here a miniguide to the cetaceans of the eastern North Pacific which can be photocopied and widely distributed at low costs. In it we have highlighted species most likely to be seen in or very near the CINMS. The miniguide is accompanied by sighting forms for (a) incidental observations (Figures I-1, and I-2,) (b) daily logs for replicate searches (Figure I-3) and (c) sample data logging forms which the CINMS cetacean research coordinator might elect to use and distribute to dedicated participants in the CINMS data network as they permit data on effort and sightings to be recorded in detail and transferred easily to computer (Figure I-4). These forms are only suggestions. Each program has specialized needs, so formats for reporting and handling data should be specifically designed for the CINMS with long term plans and budgets in mind.

Miniguide to Cetaceans of the Eastern North Pacific, with Special Reference to the CINMS

We hope this quick reference guide will be useful in identifying cetaceans encountered at sea in the eastern North Pacific. Before using it, prospective users are encouraged to study materials contained in more in-depth field guides, such as Leatherwood et al (1982), Leatherwood and Reeves (1983) and Hoyt (1984) and to refer to these books regularly to confirm tentative identifications made using the miniguide.

We have included all species of cetaceans known to occur in the eastern North Pacific. But as some species are ordinarily restricted to tropical (indicated by a "T" following the species name) and others to polar (indicated by a "P") waters we have highlighted the species from the SCB and CINMS. Of this latter category we have distinguished between residents or common seasonal migrants (indicated by an "A") and contained within bold boxes and those other species indicated by a "B") which have been reported from the CINMS or nearby waters but are not common there marked with an * next to the species name.

To use this miniguide: (1) first estimate the animal's size and determine whether or not it has a dorsal fin (2) note also any distinctive features of body shape and coloration and observe its general behavior, including swimming, blowing and diving characteristics (3) make sketches of the animals appearance and note on sketches the most distinctive visible features (4) photograph animals whenever possible (5) consult the miniguide sections to make a tentative identification and (6) upon return to a library containing detailed field guides confirm the tentative field identification.

The guide will work best if in advance of attempting to use it the reader will familiarize himself/herself with the species, by reference to more detailed guides, and school himself/herself to ask a series of questions about the animal(s) seen: (1) How large was it? (2) Did it have a fin? If so, what was its size, shape and position on the animal's back? (3) Was the animal's blow visible; if so how tall did it appear? What was its shape? How frequently did the animal blow? (4) What was the animal's color and color pattern? (5) Did it have any highly distinctive markings? (6) If it was a large or a medium-sized animal, did it show its flukes when it began its dive? (7) If it was a medium-sized or a small animal, did it approach, avoid or ignore the vessel? Did it ride the bow wave? and (8) What was its behavior? Did it breach? Was such breach graceful, with a headfirst reentry, or haracterized by a loud or splashing re-entry?

One characteristic is rarely sufficient by itself and the greater amount of information the observer can obtain and record, the greater the likelihood he or some more qualified reviewer can make a correct identification

The guide is presented in three sections – large whales, medium-sized whales and small whales, dolphins and porpoises.

LARGE WHALES (12-26 meters maximum length

With a Dorsal Fin

There are six species of large whales with a dorsal fin in the eastern North Pacific. Five of them belong to the same major baleen whale group, the balaenopterid whales or rorquals, and the sixth is the largest of the toothed whales, the sperm whale

All the rorquals have a series of ventral pleats, usually visible on stranded specimens. The length and number of these pleats are diagnostic for some species. In addition, all species have at least one distinct (though often not prominent) ridge along the head from just in front of the blowhole to near the tip of the snout. (The humpback whale's median rostral ridge is obscured by numerous knobs – resembling over-sized rivets – scattered about the head, some of which are located along the midline). In Bryde's whale, the single head ridge characteristic of the other rorquals is supplemented by two auxiliary ridges, one on each side of the main ridge. Faint lateral ridges can sometimes be detected on the rostra of fin and blue whales. Recent studies have revealed intergrades of a number of features of this group (e.g., ridges and baleen characteristics), which sometimes confound identification even when fragments of a specimen are in hand.

At sea, these whales often appear very similar and must be examined carefully before they can be identified with confidence. Observers should not feel overly disappointed about not being able to make a reliable idetification. There is enough overlap in the behavior of these whales and in the appearance of their surfacing profiles to dictate caution in using any single haracteristic for positive identification. Depending on the animal's activities, the following features may be useful in distinguishing the balaenopterids from one another: 1) the size, shape, and position of the dorsal fin and the timing of its appearance on the surface relative to the animal's blow (in general, the larger the whale, the smaller the dorsal fin, the farther back its position, and the later its appearance on the surface after the animal's blow); 2) the height of body in the area of the dorsal fin which is exposed as the animal sounds, relative to the size of the dorsal fin; 3) sometimes the blow rate and movement patterns; and 4) the shape and color of the head.

The sixth species, the sperm whale, is a toothed whale. It has a low, humplike dorsal ridge which, from certain views, particularly when the animal is humping up to begin a dive, may be clearly visible and very "dorsal-fin-like." At other times, particularly on some animals, it may be rather indistinct. Because the profile of its hump and the knuckles along its spine are often very prominent, the sperm whale has been classified with the large whales possessing a dorsal fin.

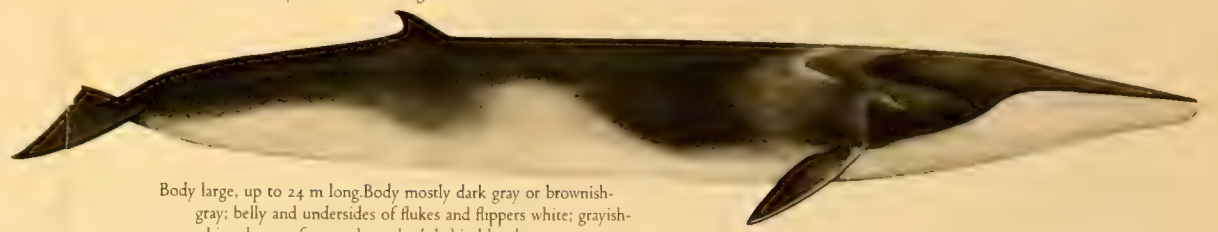
The sperm whale has a huge ponderous head (in relation to body size) and perhaps the most distinctive blow of all cetaceans, emanating as it does from a blowhole that is displaced to the left of the head near the front. The blow projects obliquely forward and to the animal's left. This blow seen under ideal conditions (no wind) positively distinguishes a large whale as a sperm whale. Remember, however, that wind conditions may affect the disposition and duration of the blow of any species and that a single character alone is seldom sufficient to permit positive identification.

Since behavior by members of the same species often varies from one encounter to the next, an observer can greatly increase the reliability of his identification by forming the habit of working systematically through a set of characteristics for the species rather than depending on any single characteristic.

Illustrations in the Large Whales section are at a scale of 1:120

Body very large, up to 26 m long.
Body basically bluish-gray with grayish-white mottling.
Baleen, palate, and tongue all black.
Head broad and nearly U-shaped, viewed from above.
Head flat in front of blowhole, viewed from side.
Dorsal fin small (up to ½m high), triangular to moderately falcate, in the last one-third of back.
Distribution from tropical to subarctic seas.
Flukes occasionally raised before long dive.

Blue Whale
Balaenoptera musculus (A)

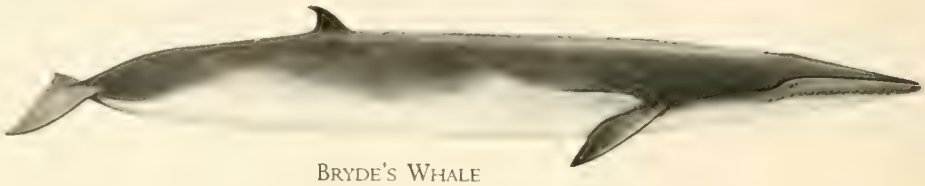


Body large, up to 24 m long.Body mostly dark gray or brownish-gray; belly and undersides of flukes and flippers white; grayish-white chevron frequently on back behind head.
Right lower lip white; right upper lip sometimes white; left lips dark.
Head long and V-shaped, viewed from above.
Right front one-third to one-fifth of baleen yellowish white; other baleen bluish-gray with yellowish-white stripes.
Dorsal fin to ⅔m high, slightly more than one-third forward from fluke notch; usually arises from back at angle of less than 40°.
Distribution more northerly during summer.
Flukes not raised on dive.

Fin Whale
Balaenoptera physalus (A)

Body up to 19 m long.
Body dark steel gray on back, often with ovoid grayish-white scars that make body appear mottled; white on front of belly; under-sides of flippers and flukes dark; Baleen black with fine, white to light gray bristles.
Dorsal fin to ⅔m high, strongly falcate, well more than one-third forward from fluke notch; usually forms angle of more than 40 degrees with back.
Distribution extensive; not very common in coldest waters in either hemisphere and may have a greater tendency than fin whales to enter tropical waters.
Distribution more northerly in summer.
Flukes not raised on dive.

SEI WHALE
Balaenoptera borealis (B)



Body up to 14 m long.
Body dark gray overall.
Head has series of three parallel ridges from area of blowholes to snout.
Baleen slate gray with coarse dark bristles.
Dorsal fin to ½m high, falcate, well more than one-third forward from fluke notch, often irregularly worn on rear margin.
Distribution primarily tropical and warm temperate.
Flukes not raised on dive.

BRYDE'S WHALE
Balaenoptera edeni (B

Body up to 16 m long.
Body dark gray to black, usually with irregular white area on throat; flippers white below, usually at least partially white above; undersides of flukes often have varying amounts of white.
Head in front of blowholes flat and covered with knobs.
Baleen dark gray to black with gray bristles.
Dorsal fin small, quite variable in shape, slightly falcate or triangular and located on a step or hump, in last one-third of back.
Flippers very long (to nearly one-third of body length), knobs on leading edge.
Distribution north at least to southern Bering Sea during summer.
Distribution to shallow tropical and subtropical banks, winter and spring.
Flukes often scalloped on trailing edges and frequently raised on dive.

HUMPBACK WHALE
Megaptera novaeangliae (A)

NOTE: Because of its small adult size, usually less than 9 m, the fifth member of the rorqual family, the minke whale, *Balaenoptera acutorostrata*, is included with the medium-sized whales in this guide. Features by which it may be distinguished from all other rorquals are discussed in the species account.

Body to 17 m long; males grow significantly larger than females.
Body dark grayish-brown to brown; wrinkled in appearance.
Back has rounded or triangular hump followed by knuckles along spine.
Head boxcar-like, comprises up to 40% of body length.
Single blowhole on left of head at front; blow projects forward obliquely and to left.
Distribution extends from tropics into Bering Sea; adult males distributed farther north (to north of 40°N) than females or young (remain south of 40°N).
Flukes straight on rear margin, marked by side V-notch, and raised on longer dives.

Sperm Whali
Physeter macrocephalus (A

Without a Dorsal Fin

There are three species of large whale without a dorsal fin in the eastern North Pacific and in western Arctic waters. All three are baleen whales. The first two, the right and bowhead whales, have enormous heads and smooth backs without even a trace of a dorsal fin. The third, the gray whale, has a head which is triangular in lateral or dorsal aspect, and a distinct dorsal ridge serrated by 6-12 crenulations that give the back a saw-toothed appearance as the animal humps up to begin a dive. All three whales have distinctive blows. In the bowhead and right whales, the projection of the blow upward from two widely separated blowholes assumes a very wide V-shape with two distinct columns, which may be seen when an animal is viewed from front or back. Though other baleen whale species may exhibit a V-shaped spout under ideal conditions, this feature is exaggerated and consistent in the bowhead and right whales and may be used as a primarly key to their identification. In the gray whale, the low bushy blow assumes in windless conditions what has been described as a "heart-shape".

The three species can best be distinguished as follows:

Body to 14 m long (usually more than 12 m).
Body mottled gray, may appear uniformly dark gray (in newborn) or light gray (in larger animals).
Head nearly triangular in dorsal and lateral profiles.
Head often bears barnacles and many cyamid "whale lice."
Line of mouth slightly arched.
Baleen yellowish-white to white, relatively short (to ⅓m long).
Blow low (less than 4 m high) and bushy.
6-12 bumps or ridges creating saw-toothed appearance on dorsal portion of tail stock.
Distribution primarily coastal, from Mexico to Beaufort Sea – strongly migratory.
Flukes raised on long dives.

Gray Whale
Eschrichtius robustus (A

Body to 16 m long.
Body dark; back smooth and finless.
Chin and belly often white.
Head lacks callosities.
Baleen dark gray with gray fringes, to 4 m or longer.
Upperjaw arched and lower lip strongly bowed.
Two blowholes clearly separated; blow projects upward in wide V-shape.
Distribution restricted to arctic waters.
Tail stock often ringed with white or gray.
Flukes, all dark, raised on longer dives.

BOWHEAD WHALE
Balaena mysticetus (P

Body to 16 m long.
Body from dark to light gray and sometimes mottled, often with irregular white patches, especially on ventrum; back smooth and finless.
Callosities (the largest of which is called the bonnet and is set on top of the snout) present on head and lower jaw, covered with cyamid crustaceans ("whale lice").
Baleen usually dark gray with dark fringes, to 2.2 m long, sometimes appears pale brownish to yellowish-gray in color when viewed through water.
Upper jaw arched and lower lip strongly bowed.
Two blowholes clearly separated; blow projects upward in wide V-shape.
Previous distribution extended from southern Bering Sea to southern Oregon with stragglers to California, Baja California, and Hawaii; current distribution unknown but appears to be severely restricted.
Flukes all dark, raised on longer dives.

RIGHT WHALE
Eubalaena glacialis (B

MEDIUM-SIZED WHALES (to 13 meters maximum length)

WITH A DORSAL FIN

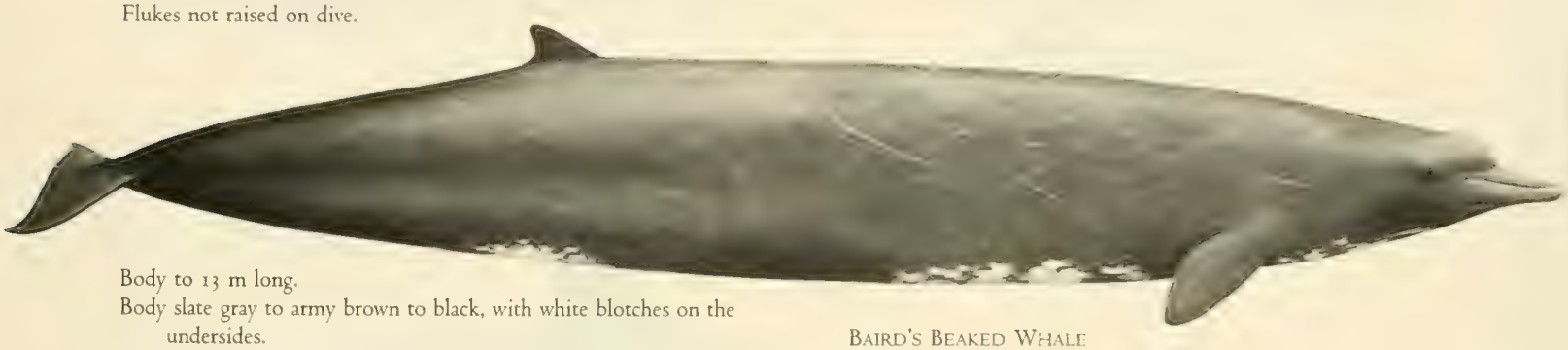
There are at least 13 species of medium-sized whales with a dorsal fin known from the eastern North Pacific. These species, taking many diverse forms, range in maximum adult size from about 4 m (Risso's dolphin) to about 13 m (Baird's beaked whale). This group includes such widely distributed and frequently encountered species as the pilot whale, false killer whale, and minke whale, and such rarely encountered and poorly known species as the various "beaked whales."

Aside from their common inclusion within the stated size range and the presence of a dorsal fin (which ranges from only a small nubbin in some of the beaked whales to a substantial 1.5-1.8 m "sail" on adult male killer whales) in all apecies, these species have little in common. Therefore, each is placed in the guide in near proximity to those species with which it is likely to be confused in the field.

Illustrations in the Medium-sized Whales section are at a scale of 1:60

Body to 10 m, or more, long.
Body black or dark gray; area of gray shading on each side just in front of and below dorsal fin.
Flippers have transverse white band.
Head very sharply V-shaped when viewed from above.
Dorsal fin falcate and distinct; usually appears simultaneously with blow.
Blow often low and indistinct.
Distribution polar, temperate, and tropical; frequently coastal.
Often curious about boats.
Flukes not raised on dive.

MINKE WHALE
Balaenoptera acutorostrata (A)



Body to 13 m long.
Body slate gray to army brown to black, with white blotches on the undersides.
Forehead prominent and bulging, sloping to long cylindrical beak.
Dorsal fin nearly triangular, in last one-third of back.
Distribution central Baja California north to Bering Sea.
Flukes large, rarely notched; occasionally raised on long dive.

BAIRD'S BEAKED WHALE
Berardius bairdii (A

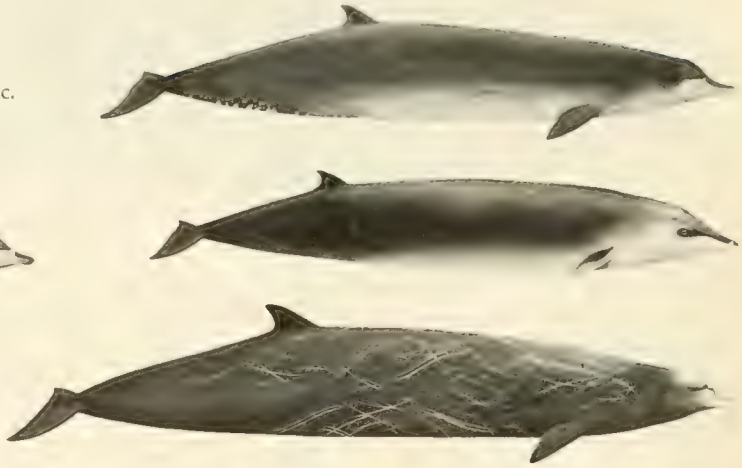
Body to estimated 7 to 9 m.
Body acorn to umber brown on back – sometimes scarred.
Belly lighter; head flaxen.
Forehead bulbous; beak long.
Dorsal fin falcate, not triangular, located behind middle of back.
Distribution tropical-equatorial.
Flukes often raised on dive.

(SOUTHERN) BOTTLENOSE WHALE
Hyperoodon sp. (T

Body to at least 7 m long.
Body from dark gray or brown to rust or fawn and splotched with white; eyes dark.
Head, and sometimes entire body, of large males white.
Back frequently scarred with numerous scratches, presumably tooth rakes.
Dorsal fin falcate and/or triangular, in last one-third of back.
Distribution primarily tropical and subtropical; extends to temperate and subarctic waters.
Flukes light beneath, sometimes shallowly notched; often raised on dive.

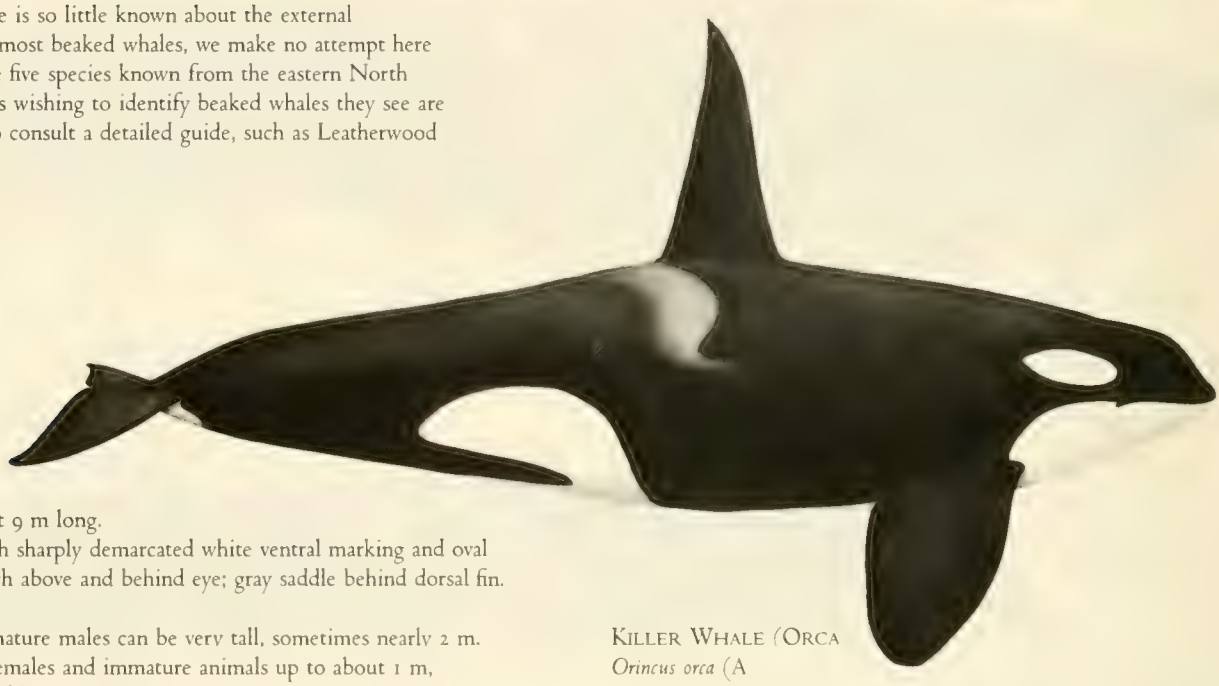
CUVIER'S BEAKED WHALE
Ziphius cavirostris (B

Body to 4-5 m long.
Body color black to dark gray, sometimes with a brownish or fawn coat.
Back frequently scarred.
Dorsal fin position varies with species but is behind midpoint of back; fin moderate in size.
Distribution varies with species, but apparently absent from Arctic.
Flukes not usually distinctly notched.



Beaked Whales of the Genus
Mesoplodon (B)

* Because there is so little known about the external appearance of most beaked whales, we make no attempt here to describe the five species known from the eastern North Pacific. Persons wishing to identify beaked whales they see are best advised to consult a detailed guide, such as Leatherwood et al. (1982).



Body to at least 9 m long.
Body black with sharply demarcated white ventral marking and oval white patch above and behind eye; gray saddle behind dorsal fin.
Body chunky.
Dorsal fin in mature males can be very tall, sometimes nearly 2 m.
Dorsal fin in females and immature animals up to about 1 m, distinctly falcate.
Distributed from tropics to Arctic; most common in colder waters.
Often seen in shallow bays and river mouths and near shore.
Flukes may be raised on dive, usually partly white beneath.

Killer Whale (Orca
Orincus orca (A

Body to at least 5.5 m long.
Body black (faint gray blaze on belly between flippers and on side of head).
Body slender.
Head small and tapering anteriorly; mouthline long.
Large prominent teeth frequently visible at sea.
Flippers have distinct S-shaped leading edge.
Dorsal fin to ½m high, falcate, and from rounded to pointed on tip; positioned well behind midpoint of back.
Distribution pelagic, tropical to warm temperate seas.
Frequently ride bow waves.

False Killer Whale
Pseudorca crassidens (B/T

Body to about 7 m long.
Body black, sometimes with light gray areas on chest; light saddle often present behind dorsal fin; eye blazes – all variable in degree of expression.
Rounded head becoming more bulbous with age.
Flippers to one-fifth of body length.
Dorsal fin long-based, low in profile, falcate to flaglike, set in front half of back.
Distribution primarily tropical and warm temperate, though extending into the Gulf of Alaska at least seasonally.
Tail stock strongly humped or keeled on upper surface – shown as animal arches to dive.

SHORT-FINNED PILOT WHALE
Globicephala macrorhynchus (A

Body to at least 4 m long.
Body of newborn light gray; darkens to uniform brown soon after birth.
Body of adults light gray or white except appendages and area at base of dorsal fin; scarred with numerous scratches.
Head blunt, not beaked.
Forehead has vertical crease in center.
Dorsal fin to ⅓m high, rather erect, and dark even in light adults.
Distribution tropical to temperate.
Rarely ride bow wave, but often ride stern wake.

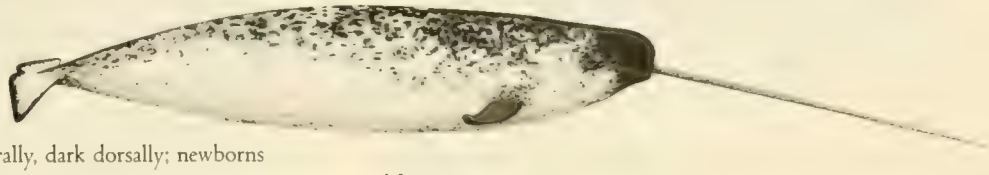
RISSO'S DOLPHIN
Grampus griseus (A

WITHOUT A DORSAL FIN

Only two species of medium sized cetaceans without a dorsal fin occur in the eastern North Pacific, the white whale (or beluga) and the narwhal (only the former is common in any part of the Northeastern Pacific or contiguous arctic, the narwhal being represented only by a handful of records). Both species are easily identifiable when seen.

Body to 5 m long.
Body of adults all white; young slate gray.
Small row of bumps along spine behind midpoint of back, sometimes dark.
Body robust with narrow tail stock, head proportionately small.
Flippers spatulate, flukes broad.
Distribution usually near coast from MacKenzie River Delta all along coasts to Bristol Bay; Cook Inlet population isolated, with occasional records as far east at Yakutat and as far southwest as Kodiak.

BELUGA (WHITE WHALE
Delphinapterus leucas (P



Body to 5 m long.
Body of adults white ventrally and laterally, dark dorsally; newborns blotchy gray; juveniles all black.
Head small and beakless; adults (mainly males) may have tusk up to 3m long.
Fleshy serrated ridge above spine replaces dorsal fin.
Distribution usually in deep water; rare in western Arctic; not known from south of Bering Sea.

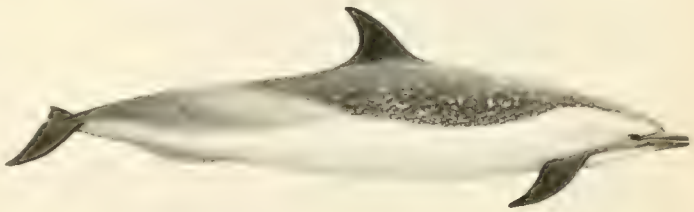
NARWHAL
Monodon monceros (P

SMALL WHALES, DOLPHINS, AND PORPOISES (less than 4 meters maximum length)

With a Dorsal Fin

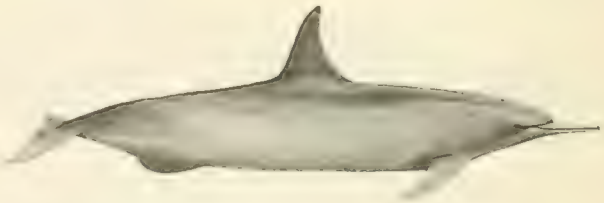
The fifteen species in this group are not discussed in order of length; instead, the species of the genus *Stenella* are treated together and then they and other species are placed in near proximity to those animals with which they are likely to be confused in the field.

Illustrations in the Small Whales section are at a scale of 1:30



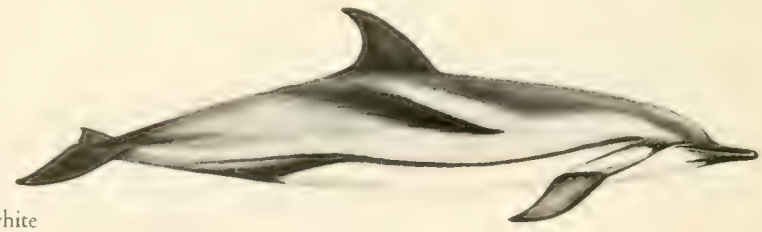
Spotted Dolphin
Stenella attenuata (T)

Body to 2.6 m long.
Coloration varies among geographical races – changes with age.
Body has dark cape, lighter ventrum.
Spotting increases with age, and adults may appear uniform gray. (Hawaiian animals of all ages less spotted.)
Beak long and distinct, often white on lips and tip.
Dorsal fin distinctly falcate, near mid-body and pointed at tip.
Except in few coastal areas do not ride bow waves – instead flee from vessels.
Distribution from tip of Baja California to latitude of Lima Peru and offshore pelagically to 145°W and around islands in the Central Pacific (Tuamotus, Marquesas, Hawaiian Islands, etc.).



Spinner Dolphin
Stenella longirostris (T)

Body to 2.2 m.
Coloration varies among races – mostly as function of extent of intrusion of dark dorsal cape over lighter lateral area and extension of white sides.
Beak extremely long and slim – usually dark above, white below.
Tip of snout and lips distinctly black.
Dorsal fin ranges from tall and triangular, even canting forward, to moderately falcate.
Often jumps and spins on longitudinal axis.
Flees from vessels in eastern tropical Pacific tuna fishing areas, rides bow wave in other areas.
Distribution tropical roughly coinciding with that of spotted dolphin.



Striped Dolphin
Stenella coeruleoalba (B)

Body to about 2.7 m long.
Body dark gray to bluish-grey on back; gray on sides; gray or white on belly.
Distinctive black stripes from (1) eye to anus (2) eye to flipper.
Distinctive light blaze often extends up and back from the edge of the cape over the eye, pointing toward the dorsal fin.
Except in some areas of tropical fishing grounds, active bow rider.
Coastal distribution from equator to at least 20°S and 20°N, with stragglers as far north as British Columbia; offshore northern distribution not well known.

Body to 2.6 m long; usually less than 2.3 m.
Body brownish-gray to black; belly and chest white; criss-cross (hourglass) pattern of yellow or tan on sides.
Distinctive V where dorsal coloration dips onto flanks below dorsal fin.
Distinct black stripe from center of lower jaw to flipper.
Beak well defined, often black, some times with white tip.
Except in areas of tropical fishing grounds, active bow rider.
Distribution tropical and warm temperate, north to at least 36°N (with stragglers to about 50°N) and south to at least 20°S.

COMMON DOLPHIN
Delphinus delphis (A)

Body to at least 2.5 m long.
Body very robust in front of dorsal fin.
Beak very short but distinct.
Cape bluish-gray; sides more complex.
Distinct black stripe from region of eye to area of anus; bordered above and below by cream white stripes.
Dorsal fin small and nearly triangular.
Flippers small and pointed.
Distribution pan-tropical.

FRASER'S DOLPHIN
Lagenodelphis hosei (T)

Body to 2.5 m long.
Body black on back with striking gray sides and white belly.
Back and side color interrupted by "suspenders", arching with back contour from behind the head, past dorsal fin towards anus.
Beak short and indistinct – dark stripe from mouth to flipper.
Dorsal fin tall and sickle-shaped – black and gray (or grayish-white).
Distribution from southern Baja California to Amchitka with seasonal shifts north and south and inshore/offshore within that range.

PACIFIC WHITE-SIDED DOLPHIN
Lagenorhynchus obliquidens (A)

Body to nearly 4 m long.
Body dark gray on back; lighter gray on sides; belly white to pink.
Beak thick and short.
Dorsal fin tall, back curved.
Ride bow waves; often turn head downwards or to the sides while doing so.
Distribution temperate and tropical, usually within 20 miles of shore (often in bays, lagoons, and larger rivers) and around islands, but extending seaward of the continental shelf; also occurring pelagically in the eastern Tropical Pacific.

BOTTLENOSE DOLPHIN
Tursiops truncatus (A)

Body to about 2.5 m long.
Body dark gray to purplish-gray on back with white or pink blotches on sides; belly white.
Cape is very narrow behind dorsal fin, broadening briefly adjacent to dorsal fin but narrowing again from front of dorsal fin to head.
Body frequently shows numerous white scars.
Head long and cone-shaped, tapering gradually from in front of flippers to tip of snout; beak long and slender; no clear separation of beak from forehead.
Rides bow waves.
Distribution in deep tropical waters.

ROUGH-TOOTHED DOLPHIN
Steno bredanensis (B

Body to almost 3 m long.
Body black to dusky gray on back (distinct cape), lighter on sides, with white belly patch which may extend onto sides in area of anus.
Head rounded; no beak; lips white; lower jaw and chin may be white.
Dorsal fin to ½m tall, erectly falcate; located near midpoint of back.
Flippers rounded on tips.
Distribution tropical and subtropical.

PYGMY KILLER WHALE
Feresa attenuata (T)

Body to at least 2.7 m.
Body black to brownish black on back, light grey on sides, light grey to white on the belly, lips often white.
Body shape similar to the Pygmy Killer Whale, elongated and slim, with a narrow tail stock.
Head triangular in dorsal and lateral aspects, jaw underslung.
Dorsal fin to 25 cm tall, usually distinctly falcate.
Distribution tropical and subtropical.

MELON-HEADED WHALE
Peponocephala electra (T

Body to nearly 4 m long.
Body dark steel gray on back; lighter gray on sides; pinkish-gray to white on belly (older animals speckled on belly).
Head blunt; lower jaw underslung; "false gills" or light bracket marks on side of head.
Dorsal fin small; located in last one-third of body.
Has not been reported to ride bow waves.
Distribution in temperate and tropical waters from at least Grays Harbor, Washington into Gulf of California.

PYGMY SPERM WHALE
Kogia breviceps (B)

Body to nearly 3 m long.
Body dark steel gray on back; lighter gray on sides; pinkish to white on belly.
Head blunt; jaw underslung; "false gills" or light bracket marks on side of head.
Two small creases on throat.
Dorsal fin like that of Atlantic bottlenose dolphin; located near midpoint of back.
Has not been reported to ride bow waves.
Distribution poorly known; at least from San Luis Obispo, County, California, to tip of Baja California.

DWARF SPERM WHALE
Kogia simus (B)

Dall's Porpoise
Phocoenoides dalli (A)

Body to 2.5 m long.
Body strikingly black with well defined white flank/belly patches; gray-white to white also present on dorsal fin near margin of flukes.
Dorsal fin small, nearly triangular, and tipped with white.
Very robust body; not streamlined in appearance; head small with very indistinct beak.
Usually very vigorous and fast swimmer; active bow-rider.
Distribution subarctic (Pribilof Islands) to cold temperate (central Baja California).

Harbor Porpoise
Phocoena phocoena (B

Body to nearly 2 m long.
Body dark brown to black above and white below; transition zone on sides often speckled or streaked; ventral white extends high onto side anterior to dorsal fin.
Head rounded; beak small and indistinct.
Dorsal fin short and triangular.
Distribution in shallow waters from at least Morro Bay north; generally found inshore; often in bays, river mouths and inlets.
Shy. Usually does not approach boats or bowride.

Cochito
Phocoena sinus (T

As nearly as is known:
Body to nearly 2 m long.
Body dark brown above and white below; transition zone on sides often speckled or streaked; ventral extends high onto side in front of dorsal fin.
Face marked with black around eye and mouth.
Head rounded; beak small and indistinct.
Dorsal fin simalar in height and general apperaence to that of bottlenose dolphins.
Distribution apparently restricted to upper quarter of Gulf of California, primarily in Colorado River Delta and shallow coastal margins.

Without a Dorsal Fin

There is only one small cetacean in the area covered by this guide which has no dorsal fin.

Right-whale Dolphin
Lissodelphis borealis (A)

Body to at least 3 m long.
Body black or browinsh-black; belly has white hourglass pattern.
Body long and slender; tailstock very slender.
Flukes small, with light zone near tips, top and bottom.
Distribution temperate (30°E to 50°N) primarily offshore.

MARINE MAMMAL SIGHTING INFORMATION

DATE AND LOCAL TIME 15 March 1985 POSITION[1] 33°59'N, 119°58'W

WEATHER CONDITIONS Partly Cloudy, Visibility under 500ft. ceiling unlimited

OCEANOGRAPHIC CONDITIONS[2] Winds 3-5 knots from west, glassy 2ft swells, long period, water 62 degrees F.

SPECIES[3] Humpback whale / Right-whale dolphins NUMBER OF ANIMAL(S) 3/60±1

IN DEGREES TRUE HEADING OF ANIMAL(S) 170-160°

ASSOCIATED ORGANISMS Red Crabs along a current line attracted gulls, shearwaters and pelicans; 3 California sea lions

TAGS OR UNUSUAL MARKINGS[4] See sketch below; Mother (?) scarred at dorsal fin

CHARACTERISTICS WHICH RESULTED IN SPECIES IDENTIFICATION For humpbacks long flipper, scallopped rear margin of flukes, humped dorsal fin; for dolphins absence of dorsal fin and black and white coloration.

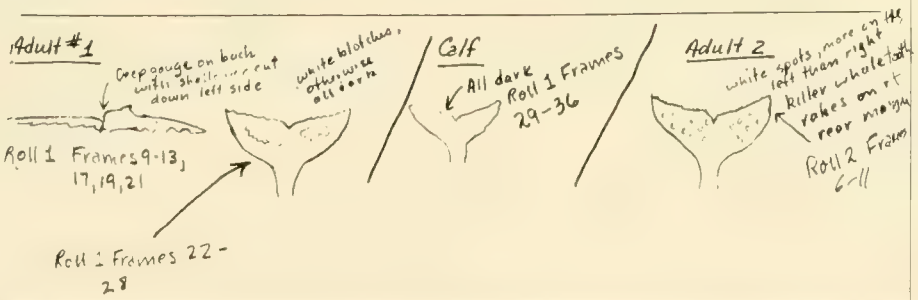
BEHAVIOR OF ANIMAL(S)-INCLUDE CLOSEST APPROACH Humpbacks passed directly under our north bound boat; dolphins rode bow wave briefly before rejoining whales

SKETCHES (see below)

PHOTOS AVAILABLE YES ✓ NO ____

ADDITIONAL REMARKS Adult #1, ca. 40ft; Calf with adult #1, ca. 16-18ft.; Adult #2 ca 38-42ft / Dolphin herd contained 3 light brown calves.

NAME AND ADDRESS OF OBSERVER (SHIP OR AIRCRAFT) K. Connally, SRV Diamaresa, c/o Island Packers, 1867 Spinnaker Drive, Ventura, California 93001 (805)642-7688



MARINE MAMMAL SIGHTING INFORMATION

DATE AND LOCAL TIME ____ POSITION[1] ____

WEATHER CONDITIONS ____

OCEANOGRAPHIC CONDITIONS[2] ____

SPECIES[3] ____ NUMBER OF ANIMAL(S) ____

IN DEGREES TRUE HEADING OF ANIMAL(S) ____

ASSOCIATED ORGANISMS ____

TAGS OR UNUSUAL MARKINGS[4] ____

CHARACTERISTICS WHICH RESULTED IN SPECIES IDENTIFICATION ____

BEHAVIOR OF ANIMAL(S)-INCLUDE CLOSEST APPROACH ____

SKETCHES

PHOTOS AVAILABLE YES ____ NO ____

ADDITIONAL REMARKS ____

NAME AND ADDRESS OF OBSERVER (SHIP OR AIRCRAFT) ____

FIGURE I-1. A sample sighting form resulting from an encounter with a mixed aggregation of cetaceans off Santa Cruz Island (left) and a blank form (right), adapted from Leatherwood et al. (1982). Remember to provide as much detail as possible so that researchers can verify tentative field identifications.

MARINE MAMMAL SIGHTING RECORD Date 5 MAY 1987 # 0026

Platform NAUTILUS III - CIMMS Guest Cruise Time 09:48

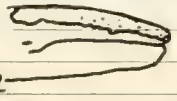
Latitude 34 ° 12.4 ' Longitude 119 ° 57.2 ' Depth 32 ft

Species E. robustus Group Size 6 + 2 − 1 Calves 1

Angle 80 °H Distance 150 M Heading 012 ° Vssl Heading 240 ° Vssl Speed 6.1 kts

Cue Blow Initial Behavior MOVING IN LINE Response to Vessel NONE

Description and/or Remarks one animal (with associated calf) has chunk missing off rt. side of flukes. Another larger animal had thick parasites on rostrum



1 breach

most fluked on long dive

5 blows before long dive

Beaufort 2 Weather Visability pt'ly cloudy - Good Vis Glare Path 180° H_2O temp 55.2 °F

ID Confidence: ✓ certain probable possible uncertain Observer(s) Daniel Eschricht

Photo(s) ☐ yes ☑ maybe ☐ no roll 1 frames 12-14 Address 491 30th Ave #1 Pt. Mugu, CA

Additional comments on another card ☐ Phone (805) 555-1212

MARINE MAMMAL SIGHTING RECORD Date _____ # _____

Platform Time

Latitude ____ ° ____ . ____ ' Longitude ____ ° ____ . ____ ' Depth ____ ft M

Species ____ Group Size ____ + ____ − ____ Calves ____

Angle ____ °H Distance ____ M Heading ____ ° Vssl Heading ____ ° Vssl Speed ____

Cue ____ Initial Behavior ____ Response to Vessel ____

Description and/or Remarks ____

sketch

Beaufort ____ Weather/Visability ____ Glare Path ____ H_2O temp ____ °C °F

ID Confidence: certain probable possible uncertain Observer(s)

Photo(s): ☐ yes ☐ maybe ☐ no roll ____ frames ____ Address ____

Additional comments on another card ☐ Phone ____

NOAA, CHANNEL ISLANDS
NATIONAL MARINE SANCTUARY
c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

FIGURE I-2. A sample single sighting form designed for a 3" by 5" card. A completed form (top) is followed by the front and back of a blank form. Copies of this form are available after Appendix II. Participants are encouraged to copy and use this form.

DAILY SIGHTING RECORD Date 5 VI 1987 # 0001

Platform NAUTILIS III General Location WSW of SANTA BARBARA

Weather SUNNY - calm seas Visibility GOOD Beaufort 1

#	time	latitude	longitude	bearing	range	group size	species	photo	idc	cc
1	07:30	Begin Effort						☐	☐	☐
2	08:46	34°11.1	119°55.0	204°	200m	2	E. robustus	☐	2	☐
3	09:26	34°9.4′	119°57.2′	56°	220m	15 ±3/2	Grampus	☐	4	☐
4	09:57	34°10.8′	119°58.1′	10°	75m	15 ± 3/2	" (same group)	✓	1	✓
5	10:20	34°5.1′	119°59.5′	2°	300m	1	B. musculus	☐	5	☐
6	11:36	34°2.8′	120°1.2′	295	250m	2	B. musculus	☐	1	☐
7	11:52	34°2.5′	120°1.1′	0°	75m	same group	"	✓	☐	☐
8	13:02	34°1.9′	120°2.9′	15°	175m	60 ±20/20	Delphinus	✓	2	☐
9	14:16	34°2.0′	120°15.1′	25°	300m	5 ±2	Humpback	✓	1	✓
10	16:20	34°3.2′	120°19.0′	30°	250m	20 ±5	Delphinus	☐	1	☐

identification confidence (idc): 1 certain 2 3 4 probable 5 6 possible 7 8 9 10 uncertain

CONTINUES

DAILY SIGHTING RECORD Date ____ #____

Platform ____ General Location ____

Weather ____ Visibility ____ Beaufort ____

#	time	latitude	longitude	bearing	range	group size	species	photo	idc	cc
1								☐	☐	☐
2								☐	☐	☐
3								☐	☐	☐
4								☐	☐	☐
5								☐	☐	☐
6								☐	☐	☐
7								☐	☐	☐
8								☐	☐	☐
9								☐	☐	☐
10								☐	☐	☐

time 24 hour clock (14 30 = 2 30 p m) bearing in ° range metric or English cc more information on continuation card
Beaufort force (in kts) 0 (<1), 1 (1-3), 2 (4-6), 3 (7-10), 4 (11-16 5 (17-21), 6 (22-27), 7 (28-33), 8 (34-40), 9 (41-47), 10 (48-55

identification confidence (idc): 1 certain 2 3 4 probable 5 6 possible 7 8 9 10 uncertain

Observer ____

Address ____

☎ ____

NOAA, CHANNEL ISLANDS
NATIONAL MARINE SANCTUARY
c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

FIGURE I-3. A sample multiple sightings form designed for a 3" by 5" card. A completed form (top) is followed by the front and back of a blank form. Copies of this form are available after Appendix II. Participants are encouraged to copy and use this form.

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY
MARINE MAMMAL SIGHTING AND EFFORT RECORD

Platform NAUTILUS III Cruise Date 1 JUNE 87 Page 1 of

Observer(s) A D. ESCHRICHT B J. E. GRAY C F.W. TRUE D

POSITION DATA					SIGHTING DATA														ENVIRONMENT & OTHER DATA						
TIME	EC	LATITUDE	LONGITUDE	DEPTH	SIGHTING NUMBER	SPECIES ID #	NUMBER OF INDIVIDUALS BEST	+	−	ANGLE	DISTANCE M	DISTANCE NM	SIGHTING	T	B	C	ANIMAL HEADING	CALVES YRLINGS	B	W	COURSE PATH	WATER TEMP	VESSEL HEADING	VESSEL SPEED	P
08 10	A	34° 11.1′	119° 55.0′										A						1	2		57°	205°	9.1 kts	
09 26	B	34° 9.4′	119° 57.2′	56 F	001	44	12	2	2	312°	350 y.		B	4	1	0	256°	2±1							
09 30	2	34° 9.4′	119° 57.2′										A										256°	10 kts	
10 11	B	34° 14′	119° 59.1′	38.1	002	10	2	-	-	004°	300 y.		A	1	6	2	219°	1							Cow/Calf
10 30	2	34° 16′	119° 59	30																			190°	9 kts	
11 15	2	34° 6.1′	119° 59.7′	42 F	003	10	1	1	0	015°	400 y.		C	1	1	2	222°								
12 00	1	34° 2.2′	119° 57.0′	104									B						2	2		58	185°	9 kts	
12 08	B	34° 1.9′	119° 57.1′	125	004	13	2	-	-	020°	750 y.		C	1	1	2	250°								

FIGURE I-4 A sample sightings form, partially filled out, intended for extensive and experienced sightings efforts. A copy of the form is available after Appendix II. Participants are welcome to copy and use this form.

TABLE I-1. Sample data coding instructions for survey effort and sightings of cetaceans (to be used with data forms shown in Figures I-4 and I-2

Data Column	*Entry*	*Explanation or Example*
1-4	Time (local)	22:15 = 10:15 p.m., seconds are insignificant.
5	Event Code	A = beginning of effort; B = sighting; C = end transect, effort; 1 = position update; 2 = course change; 3 = environmental update; 4 = observer position note; other codes can be added for greater detail.
6-11	Latitude (all °N)	In degrees, minutes, and tenths of minutes: 33°55.1′
12-17	Longitude (all °W)	In degrees, minutes, and tenths of minutes: 119°58.5′
18-20	Depth	Circle F for fathoms or M for meters and use consistently.
21-23	Sighting number	Sequential for this day.
24-25	Species identification	A two digit code representing a species, genus, or family; the sample is a guide which can be expanded.

01 = *Zalophus*	10 = *Eschrichtius*	20 = *Physeter*	30 = *Lagenorhynchus*	40 = *Grampus*	90 = ? marine mammal
02 = *Eumetopias*	11 = *Balaenoptera* sp.	21 = *Kogia breviceps*	31 = *Delphinus*	41 = *Pseudorca*	91 = ? pinniped
03 = *Callorhinus*	12 = *Megaptera*	22 = *K. simus*	32 = *Stenella coeruleoalba*	42 = *Orcinus*	92 = ? large whale
04 = *Mirounga*	13 = *B. musculus*	23 = *Berardius*	33 = *Tursiops*	43 = *Globicephala*	93 = ? medium whale
05 = *Phoca*	14 = *B. acutorostrata*	24 = *Ziphius*	34 = *Lissodelphis*	44 = _____	94 = ? sm. whale/lg. dolphin
06 = *Arctocephalus*	15 = *B. physalus*	25 = *Mesoplodon* sp.	35 = *Steno*	60 = sea turtles	95 = ? dolphin
07 = _____	16 = *B. borealis*	26 = *M. densirostris*	36 = _____	61 = _____	96 = ? porpoise
08 = _____	17 = *B. edeni*	27 = *M. carlhubbsi*	37 = _____	70 = basking shark	97 = ? sea turtle
09 = Mustilidae	18 = *Eubalaena glacialis*	28 = _____	50 = *Phocoena*	71 = great white shark	98 = ? large fish
(*Enhydra*)	19 = _____	29 = _____	51 = *Phocoenoides*	72 = billfish	99 = _____

26-28	Number of individuals	Best estimate of the number of individuals sighted.
29-32	High-low estimate	+ = High estimate; − = Low estimate of group size.
33-35	Sighting angle	Circle V for vertical (aerial sightings), 0-90 degrees as measured with a clinometer; or H for horizontal (ship or land based sightings), bow = 0°, starboard beam = 90°, port beam = 270°, stern = 180°.
36-39	Estimated distance	Circle M for meters, Y for yards, or NM for nautical miles and use consistently.
40-41	Observer making sighting	Two digit code, alpha, numeric, or alpha/numeric, identifying observers reporting.
42	Sighting cue	That which attracted observer's attention: 1 = blow; 2 = body; 3 = splash; 4 = surface disturbance; 5 = other animals (e.g. birds); 6 = vessel or other human activity; 7 = animal subsurface (aerial view); other codes can be added.
43	Initial behavior	Behavior in which the animal was engaged when first detected: 1 = moving in a straight line; 2 = milling; 3 = breaching; 4 = mating; 5 = feeding; 6 = resting; 0 = indeterminable; other codes can be added.
44	Response to survey vehicle	1 = yes; 2 = no; 9 = no entry; + = approach; − = avoid; other codes can be added for greater detail.
45-47	Animal heading	Direction of animal(s) at first detection, in degrees magnetic; 555 = no direction; 999 = no entry.
48-49	Calves	Only if certain, indicate young of the year.
50	Beaufort force	

Number	*Sea Conditions*	*Wind Velocity*	*Wave Height*	*Meteorological Term*
0	glassy, calm	0 < 1 kts		calm
1	light ripple	1 ≤ 4 kts	¼′	light air
2	small wavelets, not breaking	4 ≤ 7 kts	½′	light breeze
3	large waveletts, scattered whitecaps	7 ≤ 11 kts	2′	gentle breeze
4	small waves, frequent whitecaps	11 ≤ 17 kts	4′	moderate breeze
5	moderate waves, many whitecaps	17 ≤ 22 kts	6′	fresh breeze
6	all whitecaps, some spray	22 ≤ 28 kts	10′	strong breeze
7	breaking waves, spindrift	28 ≤ 34 kts	14′	near gale
8	medium high waves, foamy streaks	34 ≤ 41 kts	18′	gale
9	high waves, dense foamy streaks	41 ≤ 48 kts	22′	strong gale
	Beaufort 10-12 not meaningful (time to go home)			

51	Weather	1 = clear; 2 = partly cloudy; 3 = cloudy; 4 = overcast; 5 = light rain or rain within 3nm; 6 = heavy rain; 7 = patchy fog or fog within 3nm; 8 = serious fog; 9 = rain and fog; 0 = no entry.
52-53	Glare path	Two data columns: [left] 0 = no effect, 1 = sunglasses helpful, 2 = sunglasses necessary, 3 = bothersome, 4 = blinding; [right] 5 = near sighting; 6 = within 10° of sighting; 7 = 10°-30° of sighting; 8 = 30°-45° of sighting; 9 = 45°-90° of sighting; an entry of 46 means a blinding glare within 10° of sighting.
54-56	Water temperature	Circle °C for centigrade, °F for fahrenheit; include tenths.
57-59	Vessel heading	In degrees magnetic.
60-62	Vessel speed	In knots; for ships include tenths.
63-66		Four data points for additional information.
67	Photo	0 = no photos taken; 1 = photos taken; 2 = photos attempted, but not sure of success.
68	Continuation	1 = additional comments or sketches on a continuation sheet or on the reverse of the form.

Aids to Establishing a Strandings Network for the CINMS

Cetaceans may be found on beaches in the CINMS during or shortly after the stranding or many months later, when the carcass is bloated or rotted nearly beyond recognition. In some cases all that may remain from a stranding long past is a jumble of bones or other hard body parts. If the animal is alive or freshly dead, it can often be identified by reference to the portrait illustrations provided at two locations in this report – under "Systematic Accounts" or in Appendix I – or by consulting detailed descriptions published elsewhere (for example, Leatherwood, Reeves, Perrin and Evans, 1982; Leatherwood and Reeves, 1983; Hoyt, 1984). Even if it is in an advanced stage of decomposition, however, the specimen may be identifiable using the key below. Body parts referred to in the text of the key are illustrated below.

In general, the numbers and descriptions of teeth (Table II-1) and baleen plates (Table II-2) persist longest as reliable identifying characteristics. Such features are well described for some species, such as those killed in large numbers in whale or dolphin fisheries or accidentally in fisheries for other resources. For many other species, however, reported maximum sizes and ranges in tooth or baleen counts are most certainly incomplete as they represent data from few specimens. If ventral grooves are still detectable on the carcass, their presence can be used to distinguish balaenopterine (or rorqual) whales from all others and their numbers and descriptions may be used to separate the baleanopterine whales. If only the skull remains, most observers will find it difficult to sort beyond suborder or perhaps family level and usually only specialists can confirm identifications to genus and species.

The following key and accompanying tables were prepared from available published sources for the eastern North Pacific, supplemented by miscellaneous unpublished data from our files and those of colleagues. The sections on beaked whales, in particular, derive from work, mostly unpublished, by Dr. James G. Mead, U.S. National Museum and are summarized with his permission from Leatherwood, et. al. (1982) and Leatherwood and Reeves (1983). The understanding of beaked whales, as well as other cetaceans, of this area continues to be modified as new materials and information become available.

1. a. Double blowhole; no teeth present in either jaw; baleen plates in upperjaws.

   (Baleen whale) ..... Go to 2

   b. Single blowhole; teeth present (sometimes concealed beneath gums); no baleen plates in upper jaw.

   (Toothed whale) ..... Go to 9

2. a. Ventral grooves present [1]; dorsal fin present; viewed in profile, upper jaw relatively flat; viewed dorsally, upper jaw relatively broad.

   (Balaenopterine whale) ..... Go to 3

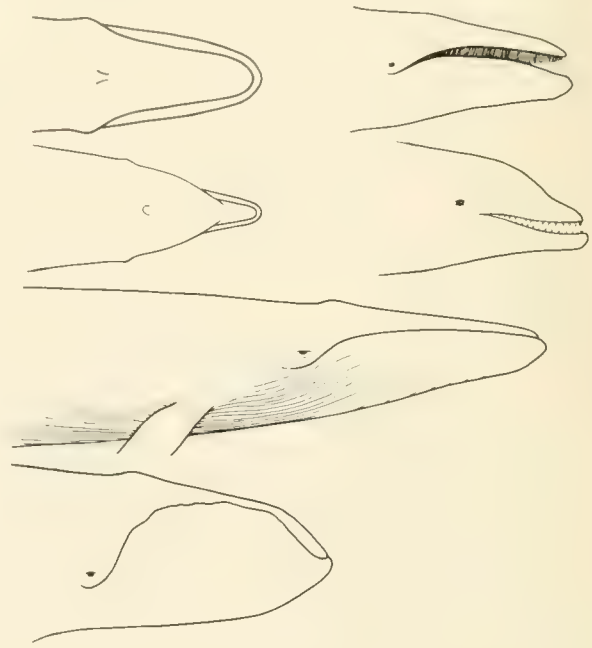
   b. Ventral grooves absent; longitudinal creases on chin or throat absent; dorsal fin absent (no trace of any fin on smooth back); viewed in profile, upper jaw and lower lips strongly arched; viewed dorsally upper jaw very narrow.

   (Right whale) ..... Go to 8

To use the key, begin with the first pair of opposing characteristics – one of the two will apply to the specimen you are examining. On the line following that statement there will be a paragraph number. Go to that paragraph. There you will find another pair of opposing characteristics. Again, one of the two will apply to the specimen you are examining. Select that entry and go to the paragraph indicated on the line following it. Continue this procedure until the statement which is true for your specimen is followed by a species name instead of a reference to another paragraph. This name should identify the specimen.

When you discover a stranding remember that all marine mammals, alive or dead, are currently protected under law in U.S. waters and on U.S. beaches. Under provisions of the Marine Mammal Protection Act of 1972 it is unlawful for persons without a permit to handle, harass or possess any marine mammal or possess any part of a marine mammal. Therefore, private citizens should be discouraged from intervening in strandings except under direct supervision of a permit holder or designated government official. Under terms of the Act any government employee is authorized to intervene in a stranding in the interests of public safety and humane treatment of the animals, provided such intervention is in the course of performance of his or her duties. Apparently, employees of the Department of Interior and the Department of Commerce assigned to the CINMS or CINP are so authorized. Strandings should be handled and animals disposed of in accordance with instructions contained in the following publication: Anonymous. 1983. California Marine Mammal Stranding Network Directory, NOAA, National Marine Fisheries Service, Southwest Region, 300 S. Ferry Street, Terminal Island, CA 90731. 40 pp.

The key includes all species of cetaceans known to occur in the Eastern North Pacific. Some are ordinarily restricted to tropical (indicated by a "T" following the species name) and others to polar (indicated by a "P") waters. Such species are not likely to be found in the SCB. Of the remainder some are residents or common seasonal migrants (indicated by an "A") while others (indicated by a "B") have been reported from the CINMS or nearby waters but are not common there.



c. Ventral grooves absent, but 2-3 deep longitudinal creases present on chin or throat; viewed dorsally or laterally head nearly triangular, mouthline slightly arched; dorsal fin absent, but small hump present, followed by 6-12 ridges or crenulations; maximum body length 14.0 m; 138-180 white to yellowish-white baleen plates per side; body mottled gray.

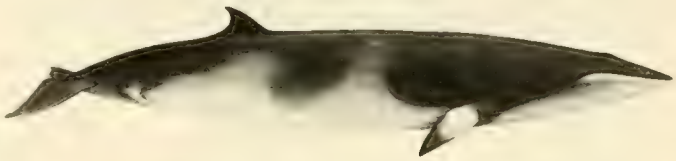
* Gray Whale, *Eschrichtius robustus* (A

3. a. Ventral grooves end before navel ..... Go to 4

b. Ventral grooves extend to or beyond navel ..... Go to 5

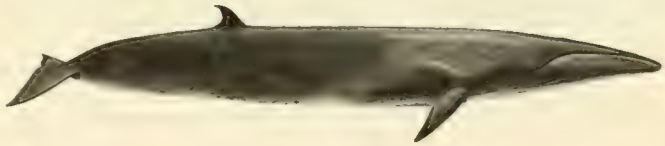
4. a. 50-70 ventral grooves [2] longest often ending between flippers; baleen less than 21 cm long, mostly white or yellowish white some posterior plates may be dark) with 15-25 white bristles per centimeter; 231-285 plates per side [3] head coloration symmetrical; maximum body length 10 m; conspicuous white band on each flipper; viewed laterally, head flat; viewed dorsally, head a slim, pointed triangle.

* Minke Whale, *Balaenoptera acutorostrata* (A)



b. 32-60 ventral grooves, longest ending well short of navel; baleen less than 80 cm long, black (some anteriormost plates may be white) and with 35-60 fine silky light bristles per centimeter; 219-402 plates per side; head coloration symmetrical; viewed laterally head slightly arched near tip; viewed dorsally head slightly rounded on tip; maximum body length 16m; flippers all dark.

* Sei Whale, *Balaenoptera borealis* (B



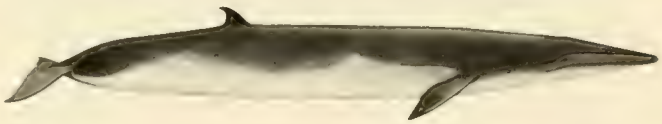
5. a. Flippers one-fourth to one-third of body length, knobbed on leading edge (two prominent knobs); less than 23 broad, conspicuous ventral grooves, longest extending at least to navel; head covered with numerous knobs; barnacles often attached to head, including lips; baleen less than 80 cm long, ash black to olive brown (sometimes whitish), with 10-35 grayish-white bristles per centimeter; 370-400 plates per side; maximum body length just over 16 m.

* Humpback Whale, *Megaptera novaeangliae* (A

b. Flippers less than one-fifth of body length and lack knobs; from 40 to 100 fine ventral grooves, longest extending at least to navel; head lacks knobs ..... Go to 6

6. a. Three conspicuous ridges on top of head, a mainridge from blowholes to tip of snout, one auxiliary ridge along each side of main ridge [4]; 40-50 ventral grooves; 255-365 slate-gray baleen plates with 15-35 dirty gray bristles per centimeter; maximum body length 14 m; head coloration symmetrical.

* Bryde's Whale, *Balaenoptera edeni* (B)



b. Only one prominent ridge on head [4], from just in front of blowholes forward towards tip of snout; 55-100 ventral grooves ..... Go to 7

[1] Ventral grooves are longitudinal folds located on the chin, throat and abdomen of rorqual whales. Do not confuse them with the 2-3 deep longitudinal creases found on the throat of gray whales (item 2.c.) or the "V" shaped creases on the throat of dwarf sperm whales (item 11.b.) and beaked whales (items 12.a, 14, and 15). Such creases, though variable in depth, orientation, and length, always end on the throat, well short of the naval.

[2] Counts of ventral grooves are made between the flippers and do not include shorter grooves often found on the side of the head and on the side above the flipper.

[3] Minke whales in some areas have been reported to have as many as 300-325 plates per side.

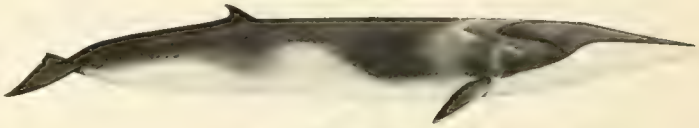
[4] Blue and fin whales have faint lateral ridges, as well.

7. a. Head broad and almost U-shaped seen dorsally; dorsal fin less than 33cm and far back on tail stock; baleen black with 10-30 black bristles per centimetre; 270-395 plates per side; plates extremely broad relative to length; maximum body length 26 m; head coloration symmetrical.

* Blue Whale, *Balaenoptera musculus* (A)

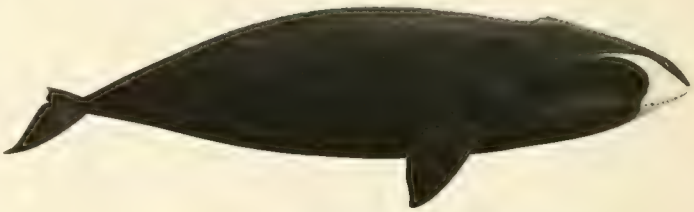
b. Head broad at gape but v-shaped and sharply pointed on tip; dorsal fin to 61 cm tall and slightly more than one-third forward from fluke notch; right front one-fifth to one-third of baleen ivory white to yellowish white, remainder dark gray to bluish gray, streaked with yellowish white; plates narrow relative to length with 10-35 gray or white bristles per centimeter; 262-473 plates per side; maximum body length to 24 m; head coloration asymmetrical, with at least right lower lip white and left gray.

* Fin Whale, *Balaenoptera physalus* (A



8. a. Top of snout lacking callosities; 325-360 baleen plates per side, longest reaching 4.3 m; plates black with black bristles (anterior portion of some plates may be whitish); maximum body length 18 meters.

* Bowhead Whale, *Balaena mysticetus* (P



b. Top of snout bearing callosities, which are usually covered with white or yellowish "lice"; 250-390 baleen plates per side, longest reaching 2.7 m; plates dark or yellowish gray (some anterior plates all or part white and some posterior plates brown or black), with 35-70 bristles per centimeter; maximum length 17 m.

* Right Whale, *Eubalaena glacialis* (B

9. a. Upper part of head extending well past tip of lower jaw; lower jaw markedly undershot and considerably narrower than upper jaw ..... Go to 10

b. Upper part of head not extending appreciably past tip of lower jaw; lower jaw approximately same width as upper jaw ..... Go to 12

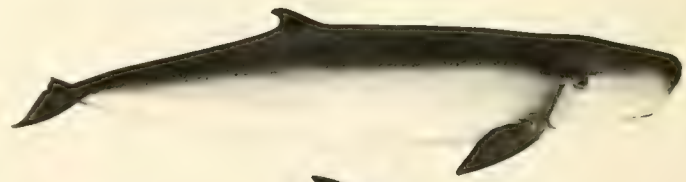
10. a. Body 4.0-16.8 m; head massive, to one-third of body length and with blunt, square snout; blowhole located far forward of eyes and to left front of head; dorsal fin low, triangular or rounded, and followed by series of knuckles or crenulations; 18-25 teeth in each lower jaw fitting into sockets in upper jaw (10-16 upper teeth rarely emerge).

* Sperm Whale, *Physeter macrocephalus* (A

b. Body less than 4.0 m; head considerably less than one-third of body length; blowhole located approximately even with eyes on top of head, slightly displaced to left of midline; conspicuous dorsal fin present; 8-16 teeth in each lower jaw fitting into sockets in upper jaw ..... Go to 11

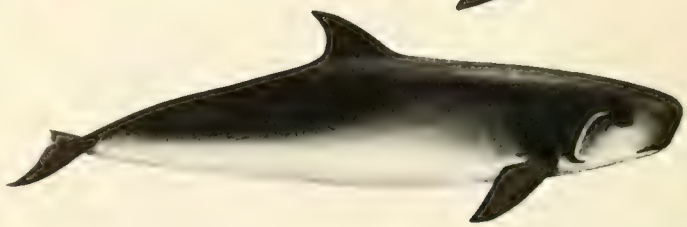
11. a. Throat creases absent; dorsal fin small and located in latter third of back; 12-16 (rarely 10-11) extremely sharp teeth in each lower jaw.

* Pygmy Sperm Whale, *Kogia breviceps* (B



b. Inconspicuous throat creases [1] present; dorsal fin tall and falcate, located near middle of back; 8-11 (rarely 13) extremely sharp teeth in each lower jaw; rarely 1-3 teeth in each upper jaw.

* Dwarf Sperm Whale, *Kogia simus* (B



12. a. Two conspicuous grooves present on throat, forming V-shape pointed forward; notch between flukes absent or inconspicuous; teeth lacking or limited to no more than 2 mandibular pairs. Beaked whale) ..... Go to 13

b. No conspicuous grooves present on throat; definite median notch on rear margin of flukes; teeth present [5] ..... Go to 17

13. a. One or two pairs of teeth at or near tip of lower jaw (erupted only in some adults). Read note below, then ..... Go to 14

b. One pair of teeth well behind tip of lower jaw (erupted only in adult males). Read note below, then ..... Go to 16

Note: Individuals, especially juveniles and adult females, of the species covered in paragraphs 14, 15 and 16 may not be readily identifiable without museum preparation and examination by an expert.

14. a. Two pairs of teeth in lower jaw, one pair exposed outside the closed mouth at tip of beak, second smaller pair situated behind the first (teeth erupt late in life for both sexes); body length to 12.8m; long, tube-like snout; steep forehead.

* Baird's Beaked Whale, *Berardius bairdii* (A)

b. One pair of teeth at tip of lower jaw (exposed only in adult males) ..... Go to 15

15. a. Beak distinct, elongated; pronounced bulge to forehead; occasionally a second smaller pair of teeth behind primary pair at apex of mandible; maximum body length to about 9 m; north Pacific distribution – tropical.

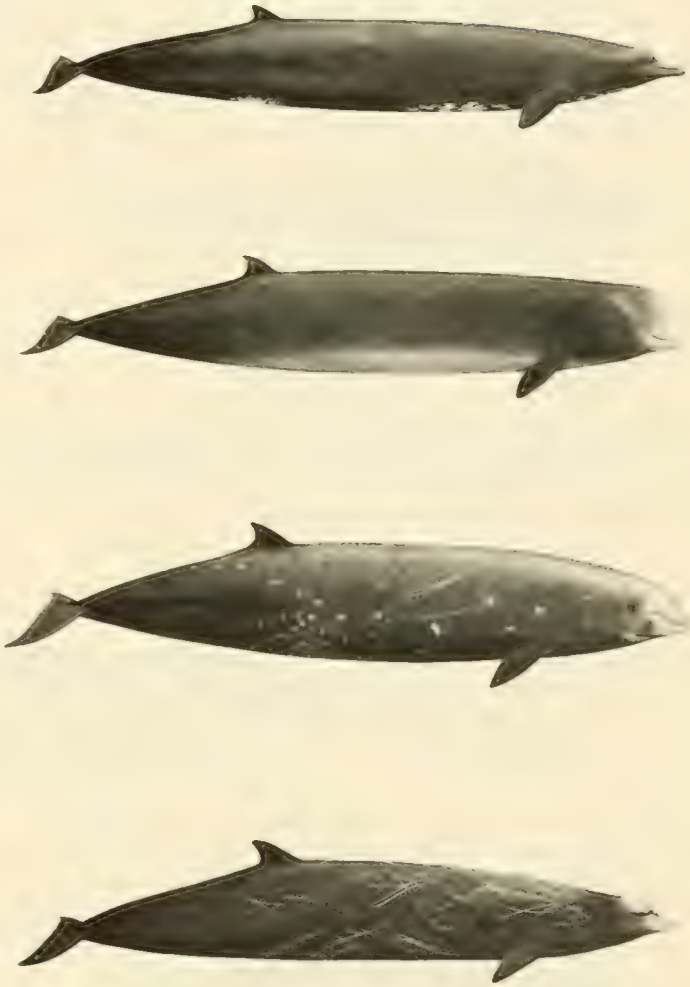
* (Southern) Bottlenose Whale, *Hyperoodon planifrons* (T)

b. Beak not distinct or elongated; head small relative to body size; forehead scooped (slightly concave) in front of blowhole, increasing in concavity with increasing size; in profile back indented behind blowhole; single pair of teeth at tip; united portion of lower jaw [6] less than one-fourth the length of entire lower jaw; mouth line upturned at gape; body coloration lighter on head, grading to all white; body length to 7.0 m; distribution from south Bering Sea to Equator.

* Cuvier's Beaked Whale, *Ziphius cavirostris* (B)

16. a. Moderate beak not sharply demarcated from forehead; males with white convexity (a "cap" or "beanie") in front of blowhole, and white anterior half of beak; females and young with light front half of lower jaw; males with large flattened tusk rooted in each side of lower jaw, protruding outside closed mouth; mouthline of females and young curved as in males but teeth unerupted; maximum body length less than 6 m. Females and young require museum preparation for positive identification. Cold temperate distribution. [7]

* Hubbs' Beaked Whale, *Mesoplodon carlhubbsi* (B)



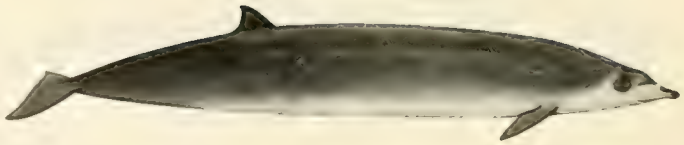
[5] Narwals (item 23.c.) and older Risso's dolphins (item 25.a.) may lack teeth.

[6] By feeling the lower jaws on the ventral surface and moving the finger towards the tip of the snout, one can feel the point at which the two lower jaws become united (called the symphysis). This location is an important reference point in distinguishing among some species of beaked whales.

[7] Due to the subtlety and complexity of beaked whale systematics, non-specialists are discouraged from making more than generic distinctions for the Mesoplodon group. Photographs are helpful, but for females and young, as well as adult males in some cases, specimen material is essential for reliable species identification. Please ensure that carefully recorded notes, photos and specimen materials reach such a specialist.

b. Distinctive white head markings absent; mound or convexity in front of blowhole absent; exposed tusks of males tilted forward, with denticle positioned near front edge; tusks protrude relatively far above gumline and often are worn along front edge; maximum body length less than 6 m. Females and young require museum preparation for positive identification. Subarctic distribution. [7]

* Stejneger's Beaked Whale, *Mesoplodon stejnegeri* (P)



c. Uniformly dark beak; forehead of males lacking prominent characteristic of (a); single thin, mandibular tusk on either side of mouth, barely breaking gumline; maximum body length 5 m. Females and young require museum preparation for positive identification. Tropical to subtropical distribution.

* Ginkgo-toothed Beaked Whale, *Mesoplodon ginkgodens* (B)

d. White markings on beak and forehead absent; lower jaw usually light in color; teeth (tusks) exceptionally large, located on bony prominences near corners of mouth, and oriented slightly forward; corners of mouth, particularly in adult males, have high-arching contour; lower jaw massive ("dense"); forehead marked by depression or concavity in front of blowhole; maximum body length 5m. Females and young require museum preparation for positive identification. Cosmopolitan distribution.

* Blainville's Beaked Whale, *Mesoplodon densirostris* (B

17. a. Rostrum, if present, not sharply demarcated from forehead ..... Go to 18

b. Distinct, though sometimes short rostrum separated from the forehead by a distinct crease ..... Go to 30

18. a. Teeth spade shaped, laterally compressed and relatively small ..... Go to 19

b. Teeth conical and sharply pointed (in cross section circular, or slightly flattened anterposteriorly) ..... Go to 22

19. a. Body to 2.2 m, extremely robust with pronounced thickened keel; dorsal fin subtriangular, usually black and gray or white; head very small relative to body size; striking black body with large conspicuous white oval patch on each side; upper rear portion of flukes white ..... Go to 20

b. Body to 1.8 m, though most individuals much smaller; dorsal fin small, almost triangular and uniformly colored; head without prominent forehead but moderately large relative to size; body brownish on back with whitish belly and light gray zone on side in front of dorsal fin ..... Go to 21

20. a. White coloration of side extends from back of chest to area of anus, does not extend forward of flippers or aft of anus; 23-28 teeth per jaw [8].

* Dall's Porpoise, *Phocoenoides dalli* (A

b. White coloration of body more extensive, extending well forward onto chest, in front of flippers, higher onto sides, and farther aft; 19-24 teeth per jaw [8].

* True's porpoise, *Phocoenoides truei* (P)

[8] It is very important to remember that for species reported by a small number of specimens tooth counts (ranges) may not fairly represent the range for the entire species and should therefore be used cautiously.

21. a. Distributed coastally in patches above Pt. Conception, rarely ranging as far north as Barrow Alaska; 23-28 teeth in each upper jaw, 22-26 teeth in each lower jaw.

* Harbor Porpoise, *Phocoena phocoena* (B

b. Distribution limited to upper end of Gulf of California in the Colorado river delta and shallow margins of coast and oceanic islands (rarely reported); 20-21 teeth per upper jaw, 18 teeth per lower jaw.

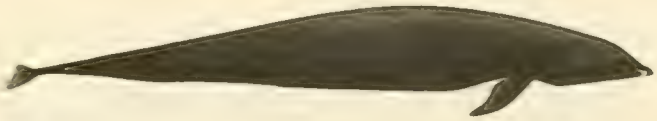
* Cochito, *Phocoena sinus* (T

22. a. Distinct dorsal fin absent, but may have small longitudinal dorsal ridge near midpoint of back ..... Go to 23

b. Distinct dorsal fin present, in middle or forward third of back ..... Go to 24

23. a. Body black with white hourglass pattern on belly; dorsal fin completely absent; beak very small but distinct; 37-49 extremely fine peglike teeth per jaw; maximum body length about 3 m; distribution primarily temperate oceanic between about 30°N and 50°N.

* Northern right-whale dolphin, *Lissodelphis borealis* (A)

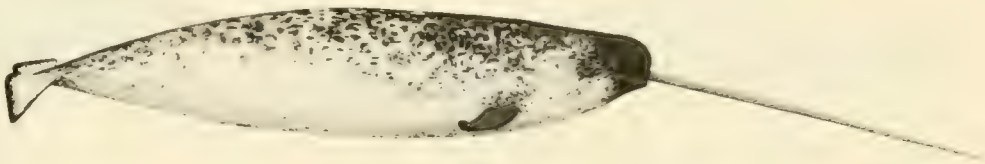


b. Adults white, young slate gray or brownish; 8-11 teeth in each upper jaw, 8-9 in each lower jaw; short broad rostrum; maximum body length 4.5 m; distribution primarily arctic, above Unimak Pass, though occurs in Cook Inlet, and rarely near Kodiak Island and in Yakutut Bay.

* Beluga or white whale, *Delphinapterus leucas* (P)

c. No visible teeth (or two teeth) in upper jaw of adults only; in males (sometimes females) one or both teeth grow to a 2.7 m tusk in left-hand (sinestral) spiral; no rostrum; maximum body length 5 m; distribution arctic, rarely reported from Alaska.

* Narwal, *Monodon monoceros* (P)



24. a. Head blunt ..... Go to 25

b. Head long and conical; no demarcation of rostrum from melon; cape very narrow except for slight widening beside dorsal fin; 20-27 teeth in each upper and lower jaw; crowns of teeth often marked with many fine vertical wrinkles; maximum body length 2.4 m.

* Rough-toothed dolphin, *Steno bredanensis* (B/T)

25. a. Teeth (2-7 pairs) usually at front end of lower jaw only, (teeth rarely in upper jaw); all teeth from lower jaw of older specimens may be absent or extensively worn; forehead with median crease; dorsal fin tall, to 38.1 cm and distinct; maximum body length 4.0 m.

* Risso's dolphin, *Grampus griseus* (A

b. Teeth (7 or more pairs) in both upper and lower jaws; forehead with no median crease ..... Go to 26

26. a. Flippers large, and paddle-shaped, ovate, and rounded on the distal end; dorsal fin tall and erect to 1.8 m in males and 0.9 m in females; 10-12 teeth in each jaw; teeth to 2.5 cm in diameter; conspicuous black and white coloration; maximum body length 9.5 m.

* Killer whale, *Orcinus orca* (A

b. Flippers long and pointed to slightly rounded at tip ..... Go to 27

27. a. Dorsal fin located in forward one-third of body, very broad at base; head bulbous; body black, saddle sometimes present behind dorsal fin and anchor-shaped white to gray patch on chin, chest and belly; flippers one-sixth to one-fifth of body length; 7-9 teeth in each jaw; thickened tail stock; maximum body length 7 m.

* Short-finned pilot whale, *Globicephala macrorhynchus* [9] (A

b. Dorsal fin located near midpoint of back; head long ..... Go to 28

28. a. Flipper has distinctive hump on forward margin; 8-11 prominent teeth curved backwards and inwards, in each upper and lower jaw; maximum body length 6 m.

* False killer whale, *Pseudorca crassidens* (B

b. Flipper lacks distinctive hump on forward margin; 8-25 teeth in each upper and lower jaw ..... Go to 29

29. a. 8-13 teeth in each jaw; flippers slightly rounded or bluntly pointed on tip; head rounded in profile; maximum body length 2.7 m.

* Pygmy killer whale, *Feresa attenuata* (T

b. 20-25 teeth in each upper jaw, 21-24 teeth in each lower jaw; flippers sharply pointed on tip; head triangular in dorsal profile; maximum length 2.7 m.

* Melon headed whale, *Peponocephala electra* (T

30. a. Beak short, usually less than about 2.5 cm ..... Go to 31

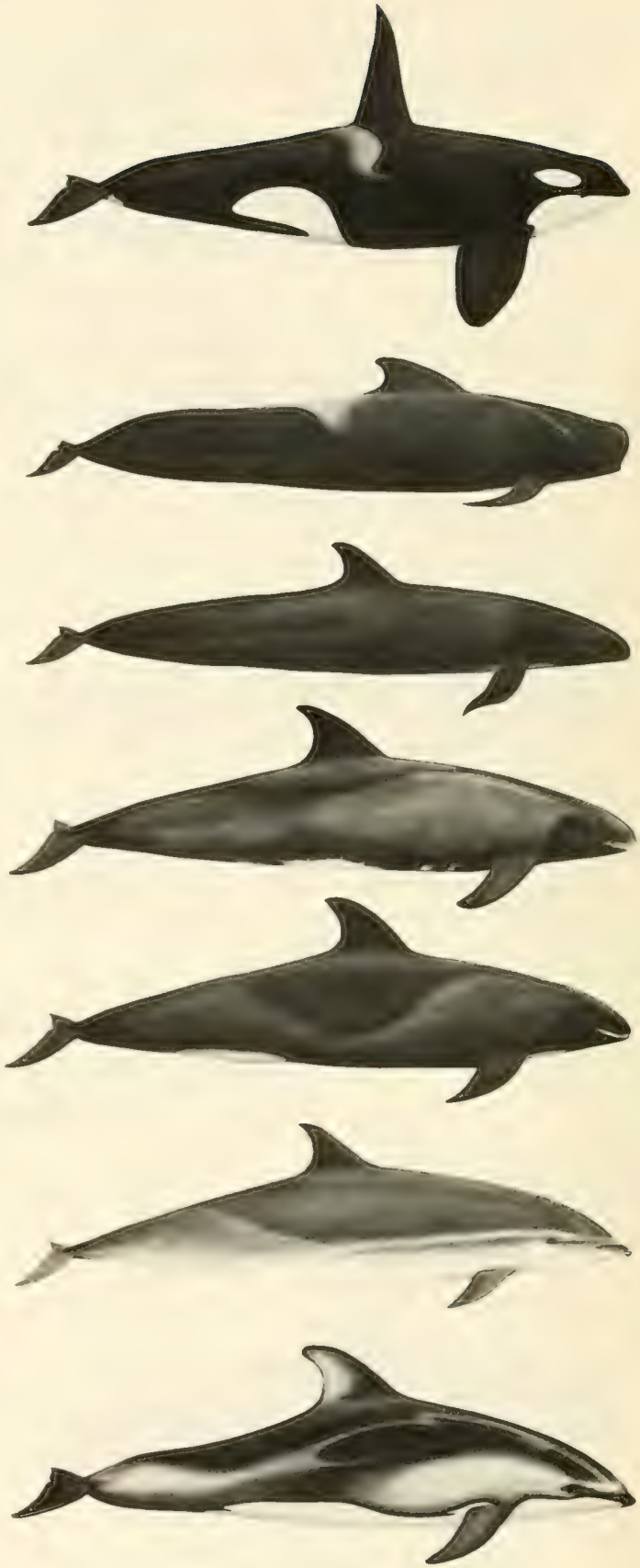
b. Beak more than 2.5 cm ..... Go to 32

31. a. Flippers very short; dorsal fin small, uniformly dark and triangular; distinct black stripe from beak to area of anus; body to at least 2.5 m; in profile beak shows very little separation from forehead; 38-44 teeth in each jaw; distribution pantropical, not reported above 20°N.

* Fraser's dolphin, *Lagenodelphis hosei* (T

b. Flippers moderate length; dorsal fin tall, scimitar-shaped (very hooked) and bi-colored black and gray; body black with striking light gray sides and white belly; black back interrupted by 2 longitudinal "suspenders"; body to at least 2.23 m; 23-32 teeth in each upper jaw, 24-31 in each lower jaw; distribution temperate, not reported below 20°N.

* Pacific white-sided dolphin, *Lagenorhynchus obliquidens* (A



[9] There continues to be controversy over the correct taxonomic placement of North Pacific pilot whales. To date there is no reliable way of distinguishing between the 2 proposed types in the flesh. The only reliable way has been to examine the skulls to determine whether or not the premaxillary bones extend outside (*G. macrorhynchus*) or are contained within the bounds of the maxillary (*G. melaena*).

32. a. 20-26 teeth in upper jaws, 18-24 in lower jaws; body to 3.7 m; teeth may be extensively worn.

* Bottlenose dolphin, *Tursiops truncatus* (A)

b. 26 or more teeth in both upper and lower jaws ..... Go to 33

33. a. 34-48 teeth in each jaw; body color varies with age and stock but includes increased spotting with age and size.

* Spotted dolphin, *Stenella attenuata* (T)

1. Body robust to 2.5 m, dark silver, heavily spotted; distributed within 60 nm of coast south of about 20°N.

* Coastal spotted dolphin (T)

2. Body elongated to 2.3 m, less heavily spotted; distributed from south of Cabo San Lucas to below Equator and west to 145°W.

* Offshore spotted dolphin

b. 46-65 teeth in each jaw; spotting absent ..... Go to 34

34. a. Dorsal fin erect, triangular or canted slightly forward; beak long and slender; teeth fine and sharply pointed.

* Spinner dolphin, *Stenella longirostris* (T)

1. Adult males have pronounced postanal hump and forward canted dorsal fin; body length to 1.9 m.

* Eastern spinner dolphin

2. Body more girthy, larger, to 2 m; belly white; sharp color differential from the dark back and sides to white belly; dorsal fin falcate.

* Whitebellied spinner dolphin

3. Body larger, to over 2 m; dorsal fin falcate; three part color pattern, dark cape, lighter sides, white belly.

* Hawaiian and Marquesan spinner dolphin

b. Dorsal fin falcate or slightly falcate ..... Go to 35

35. a. Body to 2.7 m; black to dark gray on back, gray on sides, white on belly and throat; distinctive black stripes from eye to anus, eye to flipper, and dark dorsal coloration to side above flipper; distinctive light shoulder blaze extending back and up from light lateral field; rare north of Baja California.

* Striped dolphin, *Stenella coeruleoalba* (T/B)

b. Body to maximum of 2.6 m but usually less than 2.3 m; body dark on back with light thoracic patch and crisscross or hourglass pattern on side; cape dips in V-shape just below dorsal fin; black stripe from middle of lower jaw to origin of flipper; generally uncommon north of Pt. Conception.

* Common dolphin, *Delphinus delphis* (A)

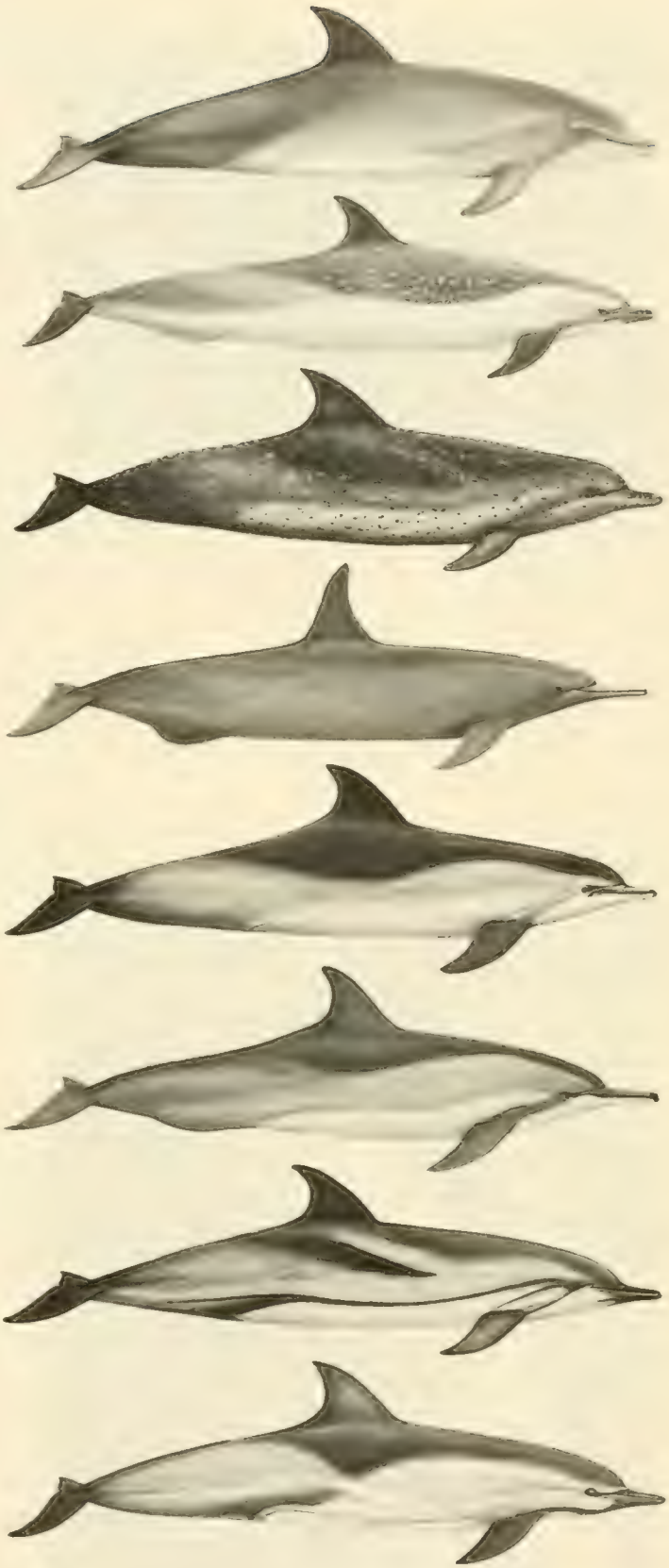


FIGURE II-1. Pacific pilot whales stranded at Simonton Cove, San Miguel Island, November 1982 (left) and near Dutch Harbor, on San Nicolas Island, Spring 1983 (right). The fresh specimen on the left is easily identifiable, even at a glance. The rotten specimen on the right is unmistakably a pilot whale, as evidenced by its bulbous melon, low, upward angling mouthline, and long, sickle shaped pectoral fins. (Photos by B. S. Stewart.)

FIGURE II-2. A Dall's porpoise ashore at Simonton Cove, San Miguel Island, 28 February 1981. At this early stage of decomposition the black and white coloration characteristic of this species is still clearly discernable. (Photo by B. S. Stewart.)

FIGURE II-3. A researcher picks barnacles and whale lice from the head of a gray whale stranded near Goleta pier. Though strandings of this coastal species are not uncommon, each such event is greeted with the same curiosity and excitement. (Photo by P. C. Howorth.)

FIGURE II-4.While waiting for help to arrive to collect a live stranded cetacean, such as this common dolphin at Pt. Mugu, California, one should endeavor to keep it as comfortable as possible. In the absence of a pool of water sufficiently deep for the animal to submerge itself, one might cover much of the body (being careful to leave the blowhole clear) with wet towels. In particular, dorsal fin, flippers and flukes should be kept wet. (Photo by S. Leatherwood.)

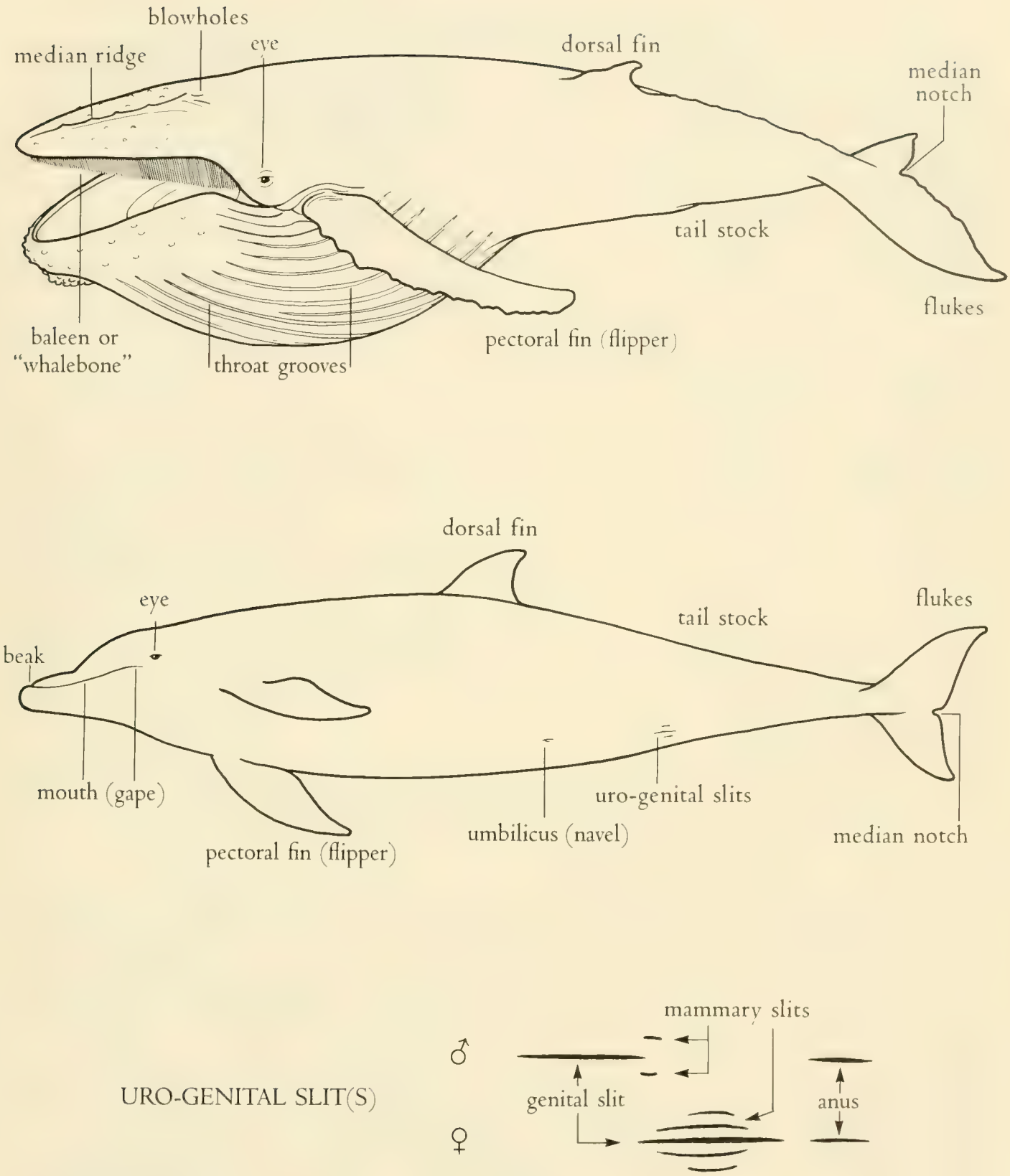


FIGURE II-5. A humpback whale (top) and a bottlenose dolphin showing major body parts referred to in the text. The lower diagram shows how to distinguish males from females. (After L. Foster in Leatherwood 1982.

Table II-1. Ranges in number of teeth in each side of upper and lower jaws of eastern North Pacific odontocetes. (Adapted from Leatherwood, Reeves, Perrrin and Evans, 1982, Table 2.)

Common Name	Scientific Name	Page of Species Account	Ranges in tooth count per row[1] upper	lower	Remarks
Sperm whale	*Physeter macrocephalus*	12	18-25	10-16	Upper teeth rarely emerge; lower teeth fit into sockets in upper jaw.
Baird's beaked whale	*Berardius bairdii*	13	0	1 or 2	At tip of lower jaw; sometimes 2nd pair behind the first in older animals.
(Southern?) bottlenose whale	*Hyperoodon* sp.		0	1[2]	At tip of lower jaw.[3]
Cuvier's beaked whale	*Ziphius cavirostris*	22	0	1[2]	At tip of lower jaw.[3]
Stejneger's beaked whale	*Mesoplodon stejnegeri*	23	0	1[2]	Teeth emerge from prominent arches behind tip of snout on either side of lower jaw.
Hubb's beaked whale	*Mesoplodon carlhubbsi*	23	0	1[2]	On raised area medlength along lower jaw.
Blainville's beaked whale	*Mesoplodon densirostris*	23	0	1[2]	On prominences near corner of mouth; forward tilting.
Ginko-toothed beaked whale	*Mesoplodon ginkodens*	23	0	1[2]	About ½ way from tip of snout to gape.[3]
Hector's beaked whale	*Mesoplodon hectori*	23	0	1[2]	Near tip of lower jaw.
Killer whale	*Orcinus orca*	20	10-12	10-12	Prominent; curved and oriented backward and inward; pointed.
False killer whale	*Pseudorca crassidens*	21	8-11	8-11	Prominent; pointed and curved.
Short-finned pilot whale	*Globicephala macrorhynchus*	18	7-9	7-9	
Risso's dolphin	*Grampus griseus*	19	0	0-7	Near front of jaw; may have fallen out in older specimens; sometimes teeth in upper jaw.
White whale (beluga)	*Delphinapterus leucas*		10-11	10-11	As few as 8 in older adults due to attrition.
Narwhal	*Monodon monoceros*		1	0	One (rarely two) pierce gum to become straight, spiraled external tusk to 3 m long.[3]
Spotted dolphin	*Stenella attenuata*		34-48	34-48	
Spinner dolphin	*Stenella longirostris*		46-59	46-59	
Striped dolphin	*Stenella coeruleoalba*	32	43-50	43-50	
Common dolphin	*Delphinus delphis*	28	40-50	40-50	
Fraiser's dolphin	*Lagenodelphis hosei*		34-44	34-44	
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	26	23-32	24-31	
Bottlenose dolphin	*Tursiops truncatus*	30	20-26	18-24	
Rough-toothed dolphin	*Steno bredanensis*	32	20-27	20-27	Tooth crown is sometimes marked by many fine vertical wrinkles.
Pygmy killer whale	*Feresa attenuata*		10-13	10-13	Lower teeth smaller; many specimens have fewer teeth on right side than on left.
Melon-headed whale	*Peponocephala electra*		22-25	21-24	
Pygmy sperm whale	*Kogia breviceps*	31	0	12-16	Rarely 10-11; curved inward and backward, fit into sockets of upper jaw.
Dwarf sperm whale	*Kogia simus*	31	0-3	7-12	Rarely 13 on lower jaw; curved backward and inward, fit into sockets in upper jaw.
Dall's porpoise	*Phocoenoides dalli*	24	19-28	20-28	
Harbor porpoise	*Phocoena phocoena*	32	23-28	22-26	Spade-shaped and relatively small.
Cochito	*Phocoena sinus*		20-21	18	Spade-shaped.
Northern right-whale dolphin	*Lissodelphis borealis*	28	37-49	37-49	Peg-like teeth, extremely fine and sharp.

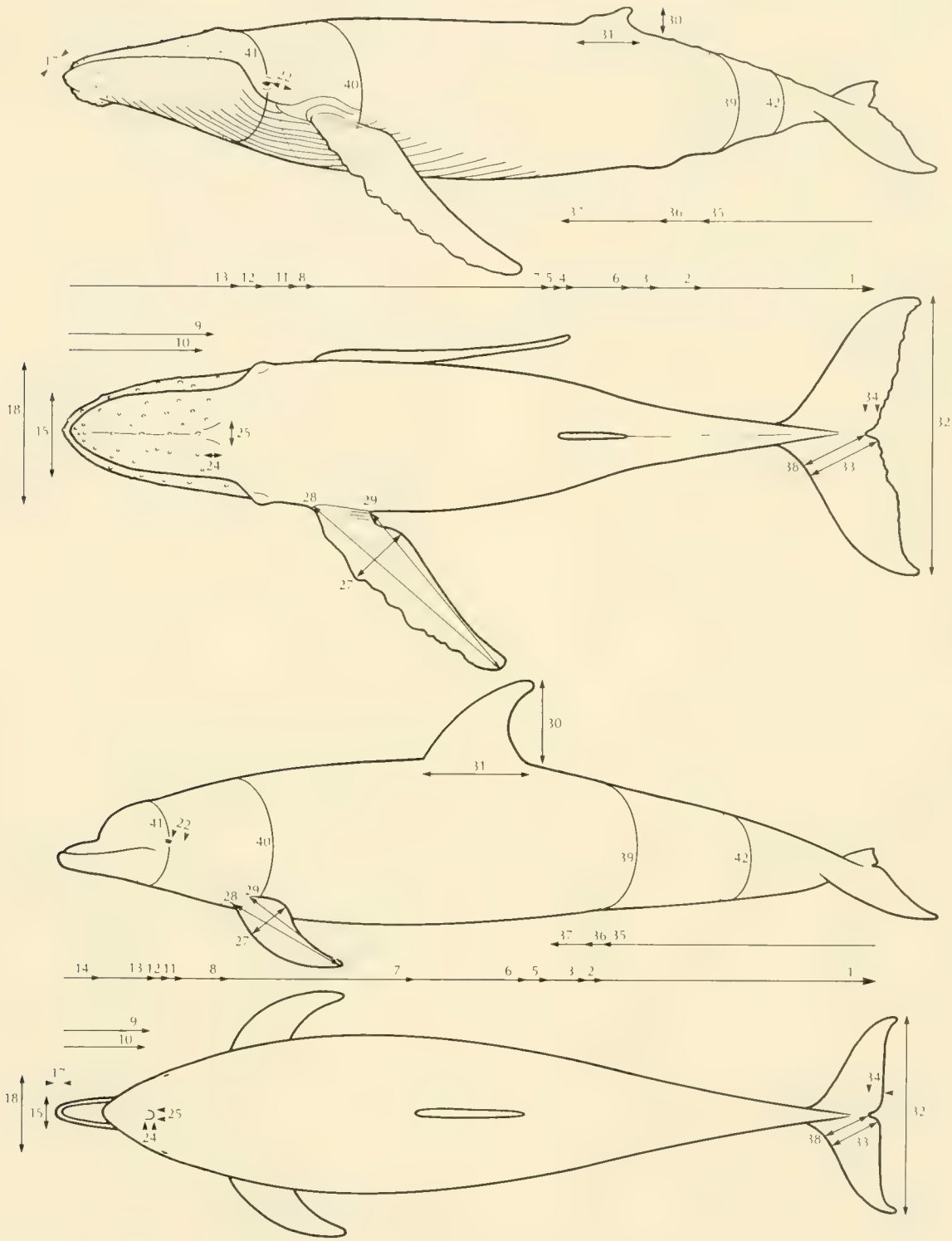
[1] It is important to remember that for species reported by a small number of specimens, tooth counts (ranges) may not fairly represent the range for the entire species and should, therefore, be used cautiously.
[2] Usually erupted from gums only in adult males.
[3] May have additional vestigial teeth in either jaw.

Table II-2. Body size; number, maximum dimensions, and description of baleen plates; and number and relative length of ventral grooves of eastern North Pacific mysticetes. (Adapted from Leatherwood, Reeves, Perin and Evans, 1982, Table 2.)

Common Name	Scientific Name	Page of Species Account	Maximum Length (meters)	# of Baleen Plates per side	Maximum Dimension of Plates (cm) length	base width	Color of Baleen	Mean # of Bristles (per cm²)	# of Ventral Grooves	Length of Ventral Grooves
Blue whale	*Balaenoptera musculus*	8	26	270-395	84	30	All black with black bristles	10-30	55-88	At least to umbilicus
Fin whale	*Balaenoptpera physalus*	10	24	262-473	70	30	Bluish grey with yellowish-white stripes; front ⅓-⅓ on right side all white	10-35	56-100	At least to umbilicus
Sei whale	*Balaenoptera borealis*	14	15.6	219-402	75-80	39	Ash black with blue tinge and fine, light bristles; some near front may be light	35-60	32-60	Ends about ½ way between flippers & umbilicus
Bryde's whale	*Balaenoptera edeni*	14	14	255-365	42	24	Slate grey with lighter grey bristles	15-35	40-50[1]	At least to umbilicus
Humpback whale	*Megaptera novaeangliae*	6	16	270-400	80	13	Black to olive brown, sometimes whitish; bristles generally olive brown, sometimes whitish	10-35	14-22	At least to umbilicus
Bowhead whale	*Balaena mysticetus*		18	230-360	430	36.5	Dark grey to black; fringes slightly lighter		None	
Right whale	*Eubalaena glacialis*	15	17	206-268	280	30.5	Dirty or yellowish grey; black fringes, some anterior plates partly or all white	35-70	None	
Gray whale	*Eschrichtius robustus*	4	14	138-180	37	18	Yellowish white to white		None	2-5 longitudinal creases on chin and throat
Minke whale	*Balaenoptera acutorostrata*	16	10	231-285	21	10	White to yellowish white; posterior plates may be brown or black	15-25	50-70	End short of umbilicus, often just behind flippers

[1] Suspected range is greater for the species in as much as many probable Bryde's whales were previously lumped with sei whales.

CETACEAN DATA RECORD



Species _____ Sex _____ Length _____ Weight _____

Date/Time Stranded _____ Date/Time Data Collected _____

Location of Collection _____

Observer's Name & Address _____

Specimen Sent to _____

MEASUREMENTS:

	Straight line parallel to the body axis	Point to point
1. Tip of upper jaw to deepest part of fluke notch		
2. Tip of upper jaw to center of anus		
3. Tip of upper jaw to center of genital slit		
4. Tip of lower jaw to end of ventral grooves		
5. Tip of upper jaw to center of umbilicus		
6. Tip of upper jaw to top of dorsal fin		
7. Tip of upper jaw to leading edge of dorsal fin		
8a. Tip of upper jaw to anterior insertion of flipper (right)		
b. Tip of upper jaw to anterior insertion of flipper (left)		
9. Tip of upper jaw to center of blowhole(s)		
10. Tip of upper jaw to anterior edge of blowhole(s)		
11a. Tip of upper jaw to auditory meatus (right)		
b. Tip of upper jaw to auditory meatus (left)		
12a. Tip of upper jaw to eye (right)		
b. Tip of upper jaw to eye (left)		
13. Tip of upper jaw to angle of gape		
14. Tip of upper jaw to apex of melon		
15. Rostrum—maximum width		
16. Throat Grooves—length		
17. Projection of lower jaw beyond upper (if reverse, so state)		
18. Center of eye to center of eye		
19a. Height of eye (right)		
b. Height of eye (left)		
20a. Length of eye (right)		
b. Length of eye (left)		
21a. Center of eye to angle of gape (right)		
b. Center of eye to angle of gape (left)		
22a. Center of eye to external auditory meatus (right)		
b. Center of eye to external auditory meatus (left)		
23a. Center of eye to center of blowhole (right)		
b. Center of eye to center of blowhole (left)		
24. Blowhole length		
25. Blowhole width		
26. Flipper width (right)		

	Straight line parallel to the body axis	Point to point
27. Flipper width (left)		
28a. Flipper length—tip to anterior insertion (right)		
a. Flipper length—tip to anterior insertion (left)		
29a. Flipper length—tip to axilla (right)		
a. Flipper length—tip to axilla (left)		
30. Dorsal fin height		
31. Dorsal fin base		
32. Fluke span		
33. Fluke width		
34. Fluke—median notch depth		
35. Fluke notch to center of anus		
36. Fluke notch to center of genital aperature		
37. Fluke notch to umbilicus		
38. Fluke notch to nearest point on leading edge of flukes		
39. Girth at anus		
40. Girth at axilla		
41. Girth at eye		
42. Girth _____ cm in front of fluke notch		
43a. Blubber thickness (middorsal)		
b. Blubber thickness (lateral)		
c. Blubber thickness (midventral)		
44. Width of head at post-orbital process of frontals		
45. Tooth counts: right upper _____		
right lower _____		
left upper _____		
left lower _____		
46. Baleen counts: right upper _____		
left upper _____		
47. Baleen plates, longest length		
48. Baleen plates, # of bristles/cm over 5cm		
49a. Mammary slit length (right)		
a. Mammary slit length (left)		
50. Genital slit length		
51. Anal slit length		

Daily Sighting Record

Date_____ #

Platform_____ General Location_____

Weather_____ Visibility_____ Beaufort_____

#	time	latitude	longitude	bearing	range	group size	species	photo	idc	cc
1								☐	☐	☐
2								☐	☐	☐
3								☐	☐	☐
4								☐	☐	☐
5								☐	☐	☐
6								☐	☐	☐
7								☐	☐	☐
8								☐	☐	☐
9								☐	☐	☐
10								☐	☐	☐

time: 24 hour clock (14:30 = 2:30 p.m.) bearing: in ° range: metric or English cc: more information on continuation card
Beaufort force (in kts.): 0 (<1), 1 (1-3), 2 (4-6), 3 (7-10), 4 (11-16), 5 (17-21), 6 (22-27), 7 (28-33), 8 (34-40), 9 (41-47), 10 (48-55)

identification confidence (idc): 1 2 3 4 5 6 7 8 9 10

Marine Mammal Sighting Record

Date_____ #

Platform_____ Time_____

Latitude_____°_____.____' Longitude_____°_____.____' Depth_____ F M

Species_____ Group Size_____ + _____ – _____ Calves_____

Angle_____ °H Distance_____ N Heading_____ ° Vssl Heading_____ ° Vssl Speed_____

Cue_____ Initial Behavior_____ Response to Vessel_____

Description and/or Remarks_____

sketch

Beaufort_____ Weather/Visability_____ Glare Path_____ H_2O temp_____

ID Confidence: certain probable possible uncertain Observer(s)_____

Photo(s): ☐yes ☐maybe ☐no roll____ frames____ Address_____

Additional comments on another card ☐ Phone_____

Daily Sighting Record

Date_____ #

Platform_____ General Location_____

Weather_____ Visibility_____ Beaufort_____

#	time	latitude	longitude	bearing	range	group size	species	photo	idc	cc
1								☐	☐	☐
2								☐	☐	☐
3								☐	☐	☐
4								☐	☐	☐
5								☐	☐	☐
6								☐	☐	☐
7								☐	☐	☐
8								☐	☐	☐
9								☐	☐	☐
10								☐	☐	☐

time: 24 hour clock (14:30 = 2:30 p.m.) bearing: in ° range: metric or English cc: more information on continuation card

identification confidence (idc):

Marine Mammal Sighting Record

Date_____ #

Platform_____ Time_____

Latitude_____°_____.____' Longitude_____°_____.____' Depth_____ F M

Species_____ Group Size_____ + _____ – _____ Calves_____

Angle_____ °H Distance_____ N Heading_____ Vssl Heading_____ Vssl Speed_____

Cue_____ Initial Behavior_____ Response to Vessel_____

Description and/or Remarks_____

sketch

Beaufort_____ Weather/Visability_____ Glare Path_____ H_2O temp_____

ID Confidence: certain probable possible uncertain Observer(s)_____

Photo(s): ☐yes ☐maybe ☐no roll____ frames____ Address_____

Additional comments on another card ☐ Phone_____

NOAA, Channel Islands
National Marine Sanctuary
c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

Observer(s): _____

Address _____

_____

☎ _____

NOAA, Channel Islands
National Marine Sanctuary
c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

_____

_____

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☎ _____

NOAA, Channel Islands
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c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

NOAA, Channel Islands
National Marine Sanctuary
c/o The Sea Center
211 Stearns Wharf
Santa Barbara, California
93101

Attn: Sanctuary Manager

EVENT CODE
A = beginning of effort
B = sighting
C = end transect
1 = position update
2 = course change
3 = environmental change
4 = observer position
5 = ______
6 = ______

SPECIES
01 = *Zalophus*
02 = *Eumetopias*
03 = *Callorhinus*
04 = *Mirounga*
05 = *Phoca*
06 = *Arctocephalus*
07 = ______
08 = ______
09 = *Mustilidae*
10 = *Eschrichtius*
11 = *Balaenoptera sp*
12 = *Megaptera*
13 = *B. musculus*
14 = *B. acutorostrata*
15 = *B. physalus*
16 = *B. borealis*
17 = *B. edeni*
18 = *Eubalaena glacialis*
19 = ______
20 = *Physeter*
21 = *Kogia breviceps*
22 = *K. simus*
23 = *Berardius*
24 = *Ziphius*
25 = *Mesoplodon sp*
26 = *M. densirostris*
27 = *M. carlhubbsi*
28 = ______
29 = ______
30 = *Lagenorhynchus*
31 = *Delphinus*
32 = *Stenella coeruleoalba*
33 = *Tursiops*
34 = *Lissodelphis*
35 = *Steno*
36 = ______
37 = ______
50 = *Phocoena*
51 = *Phocoenoides*
40 = *Grampus*
41 = *Pseudorca*
42 = *Orcinus*
43 = *Globicephala*
44 = ______
60 = turtles
61 = ______
70 = basking shark
71 = great white shark
72 = ______
90 = ? marine mammal
91 = ? pinniped
92 = ? large whale
93 = ? medium whale
94 = ? sm. whale/lg. dolphin
95 = ? dolphin
96 = ? porpoise
97 = ? sea turtle
98 = ? large fish
99 = ______

	#	*sea condition*	*wind*	*wave*
	0	glassy, calm	0 < 1 kts	
B	1	light ripple	1 ≤ 4 kts	1/4'
E	2	small wavelets	4 ≤ 7 kts	1/2'
A	3	scattered whitecaps	7 ≤ 11 kts	2'
U	4	small waves, frequent whitecaps	11 ≤ 17 kts	4'
F	5	moderate waves, many whitecaps	17 ≤ 22 kts	6'
O	6	all whitecaps, some spray	22 ≤ 28 kts	10'
R	7	breaking waves, spindrift	28 ≤ 34 kts	14'
T	8	medium high waves, foamy streaks	34 ≤ 41 kts	18'
		Beaufort 9-12 not meaningful (time to go home)		

WEATHER
1 = clear
2 = partly cloudy
3 = cloudy
4 = overcast
5 = light rain or rain w/in 3nm
6 = heavy rain
7 = patchy fog or fog w/in 3nm
8 = serious fog
9 = rain and fog

GLARE PATH
0 = no effect
1 = sunglasses helpful
2 = sunglasses necessary
3 = bothersome 4 = blinding
5 = near sighting (2nd column)
6 = within 10° of sighting
7 = 10°-30° of sighting
8 = 30°-45° of sighting
9 = 45°-90° of sighting

CUE
1 = blow
2 = body
3 = splash
4 = surface disturbance
5 = other animals (e.g. birds)
6 = vessel or other human activity
7 = animal subsurface (aerial view)
8 = ______
9 = ______

INITIAL BEHAVIOR
1 = moving in straight line
2 = milling
3 = breaching
4 = mating
5 = feeding
6 = resting
7 = ______
8 = ______
0 = indeterminable

RESPONSE TO VEHICLE
1 = yes
2 = no
9 = no entry
+ = approach
0 = ignore
− = avoid

ANIMAL HEADING
555 = no direction
999 = no entry

Channel Islands National Marine Sanctuary
Marine Mammal Sighting and Effort Record

Platform ______ Cruise ______ Date ______ Page ___ of ___

Observer(s) A ______ B ______ C ______ D ______

POSITION DATA					SIGHTING DATA													ENVIRONMENT & OTHER DATA								
TIME	EC	LATITUDE	LONGITUDE	DEPTH F M	SIGHTING NUMBER	SPECIES ID #	NUMBER OF INDIVIDUALS BEST	+	−	ANGLE V or H	DISTANCE M Y NM	OBSERVER MAKING SIGHTING	CUE	IB	RSV	ANIMAL HEADING	CALVES YRLINGS	B	W	GLARE PATH	WATER TEMP °C °F	VESSEL HEADING	VESSEL SPEED		P	C
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NOAA

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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